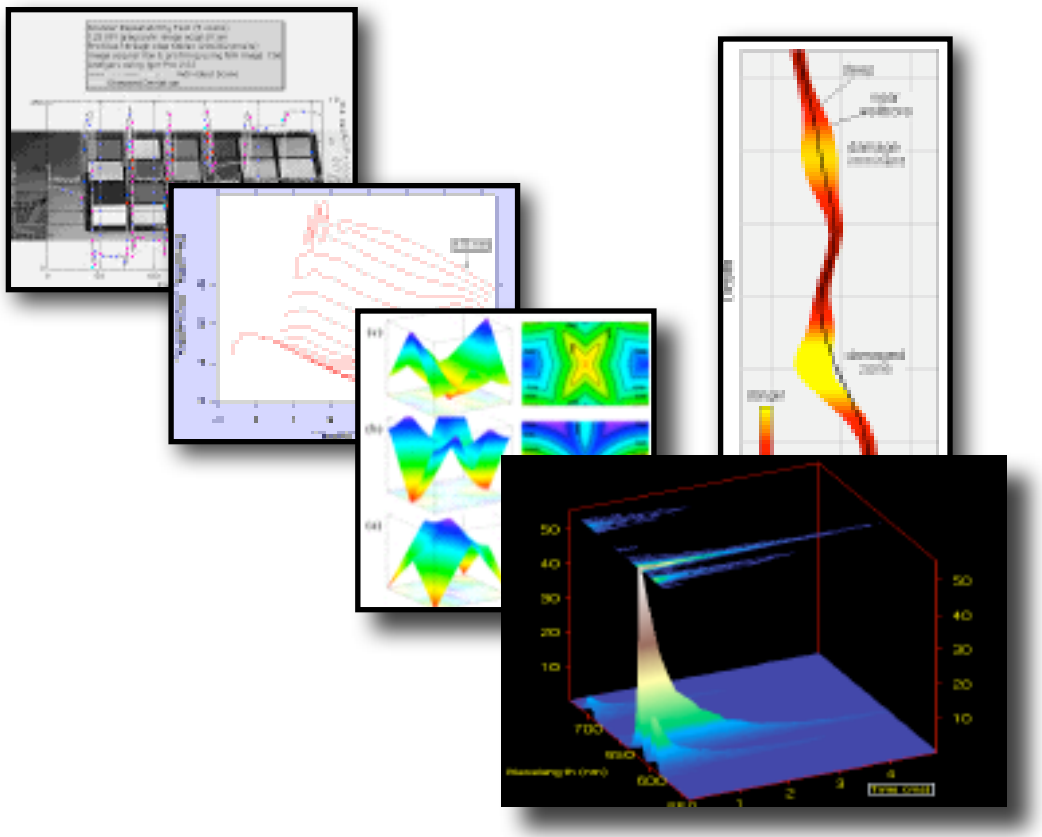
LLNL

PDV Analysis using Igor Pro



IGOR Pro

Damon D Jackson

Igor Pro

- According to the WaveMetrics web page:
  - Igor Pro is an extraordinarily powerful and extensible scientific graphing, data analysis, image processing and programming software tool for scientists and engineers.
- Runs on both a Mac and PC
- Both command line and/or menu driven
- Great for:
  - Data Analysis
  - Loading huge files
  - Automating common procedures

Damon's Motivation for Talk

- Using Igor Pro for over 10 years
- Written variety of macros to automate my own work
- Encouraged by Ed Roos to get Ashok Kumar's Igor Pro PDV analysis tool running for our group
- Implemented several major upgrades to Ashok's original procedure

What this tool does

Read in a file of PDV data (voltage vs time)

↘

Go through the steps to perform a Wigner Transform

↘

For each time step, find the location of the max WT intensity (velocity)

↘

Export time, velocity, and velocity error data to a new file

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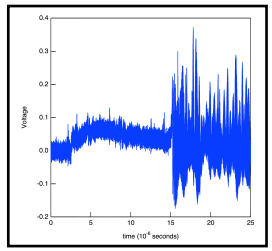

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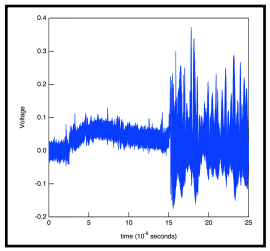

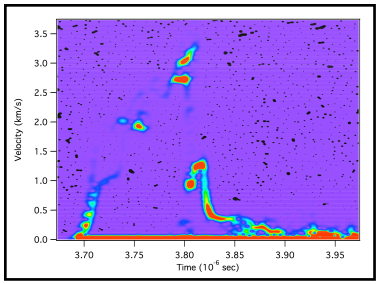

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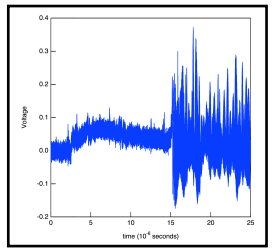

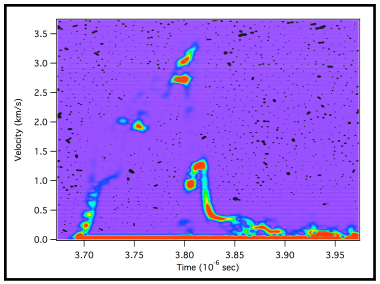

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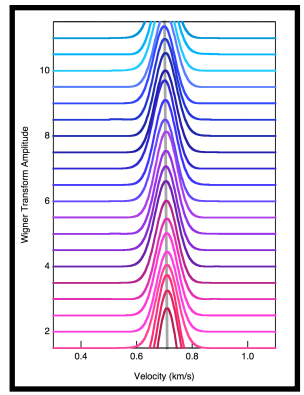

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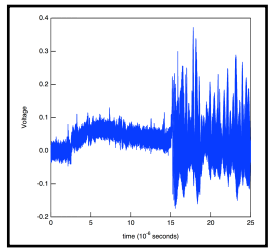

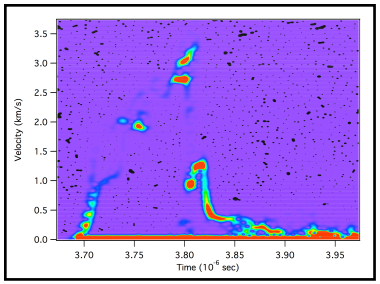

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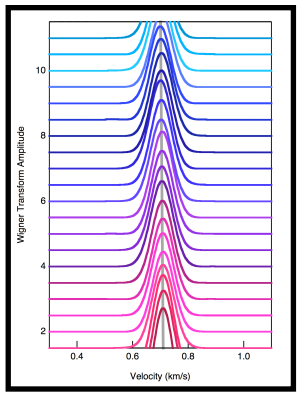

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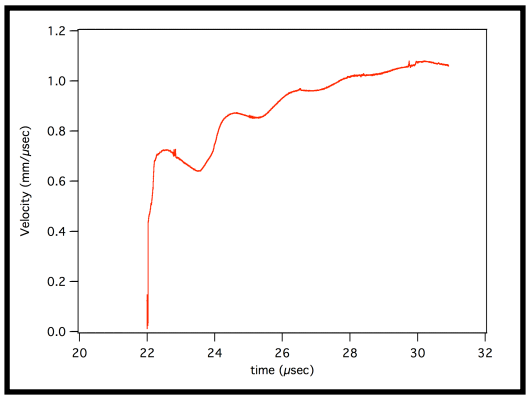

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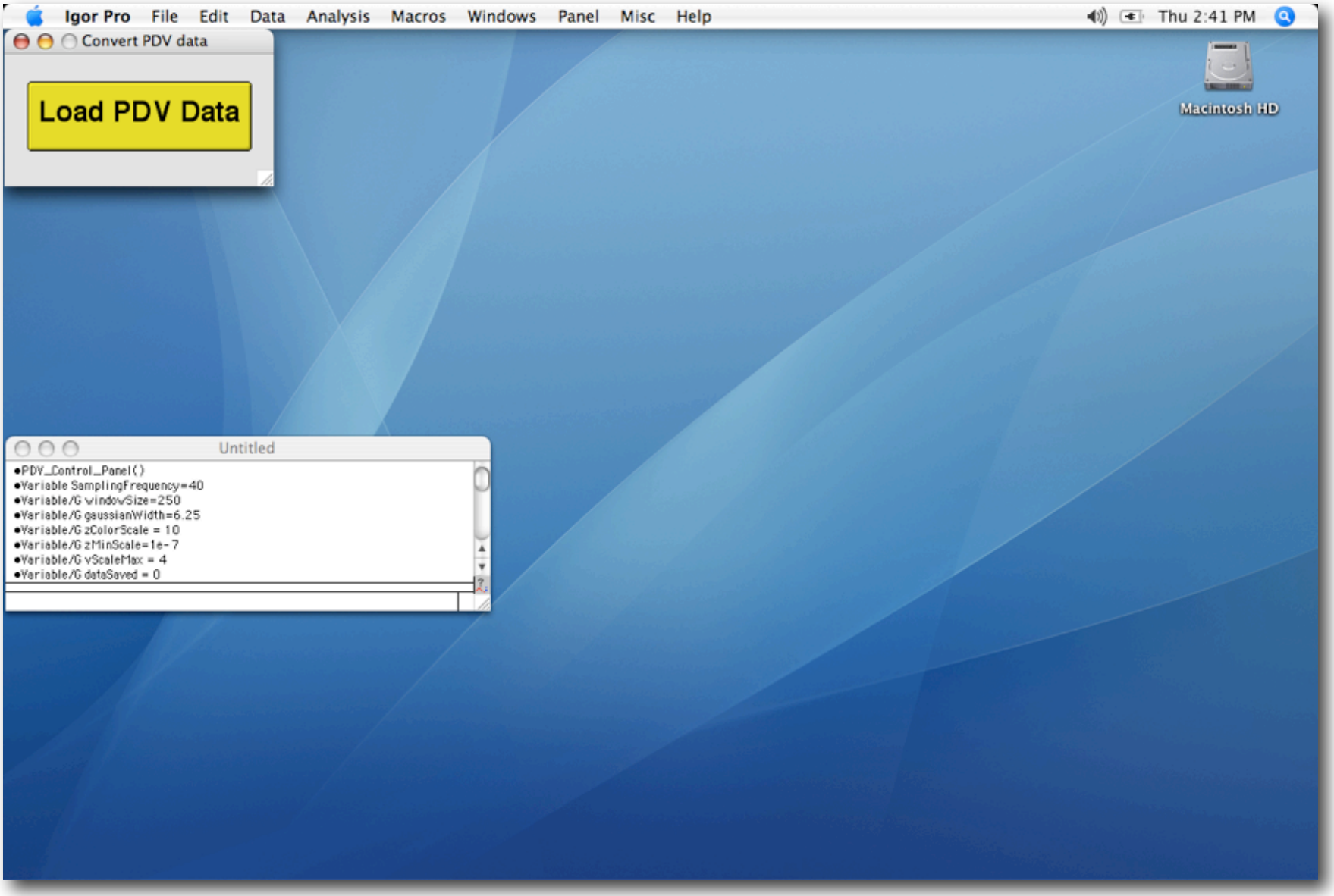
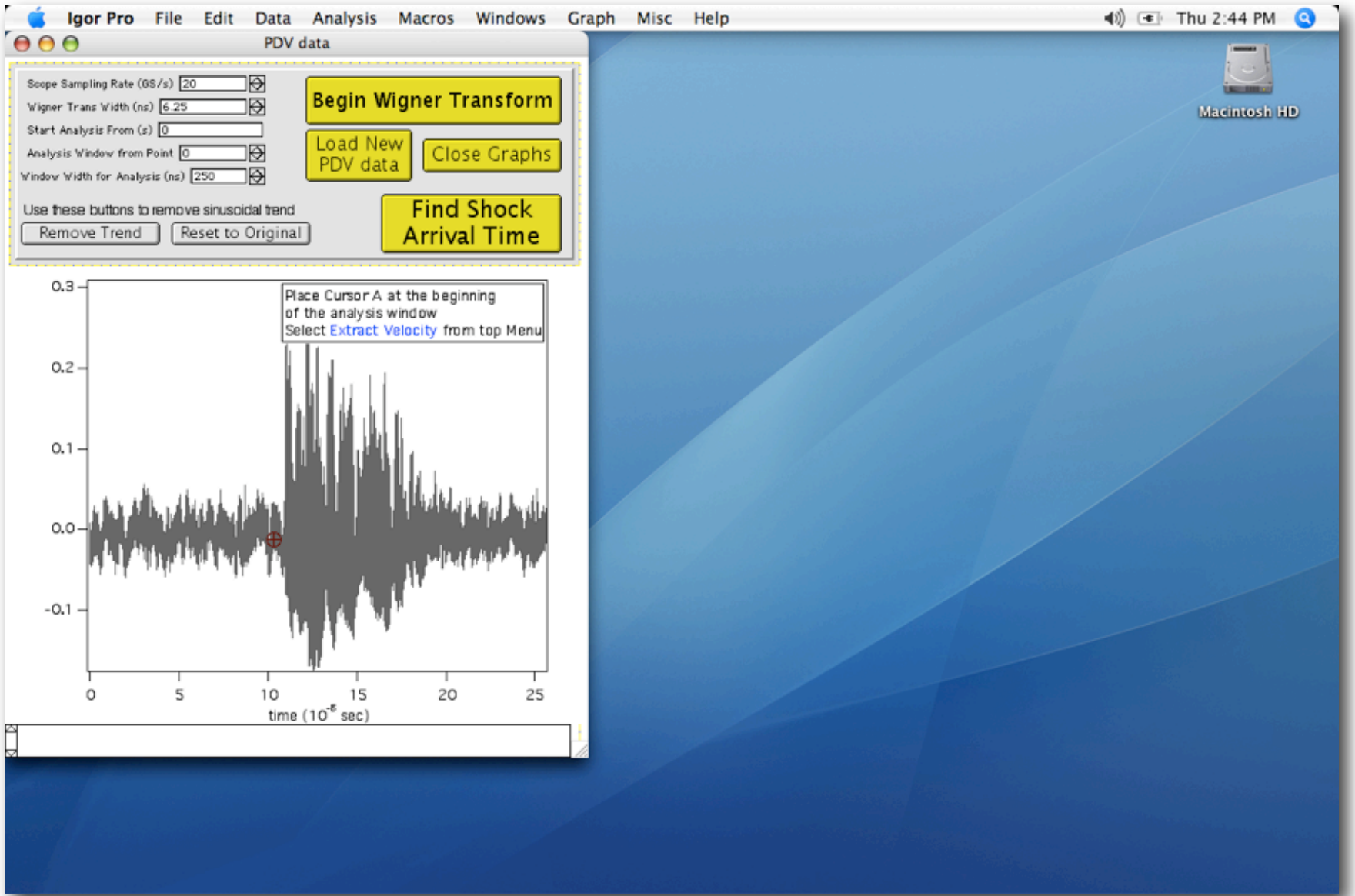
Quick Guide Through the Program



Load the PDV data and place the cursor at the start



Data from Ted Strand

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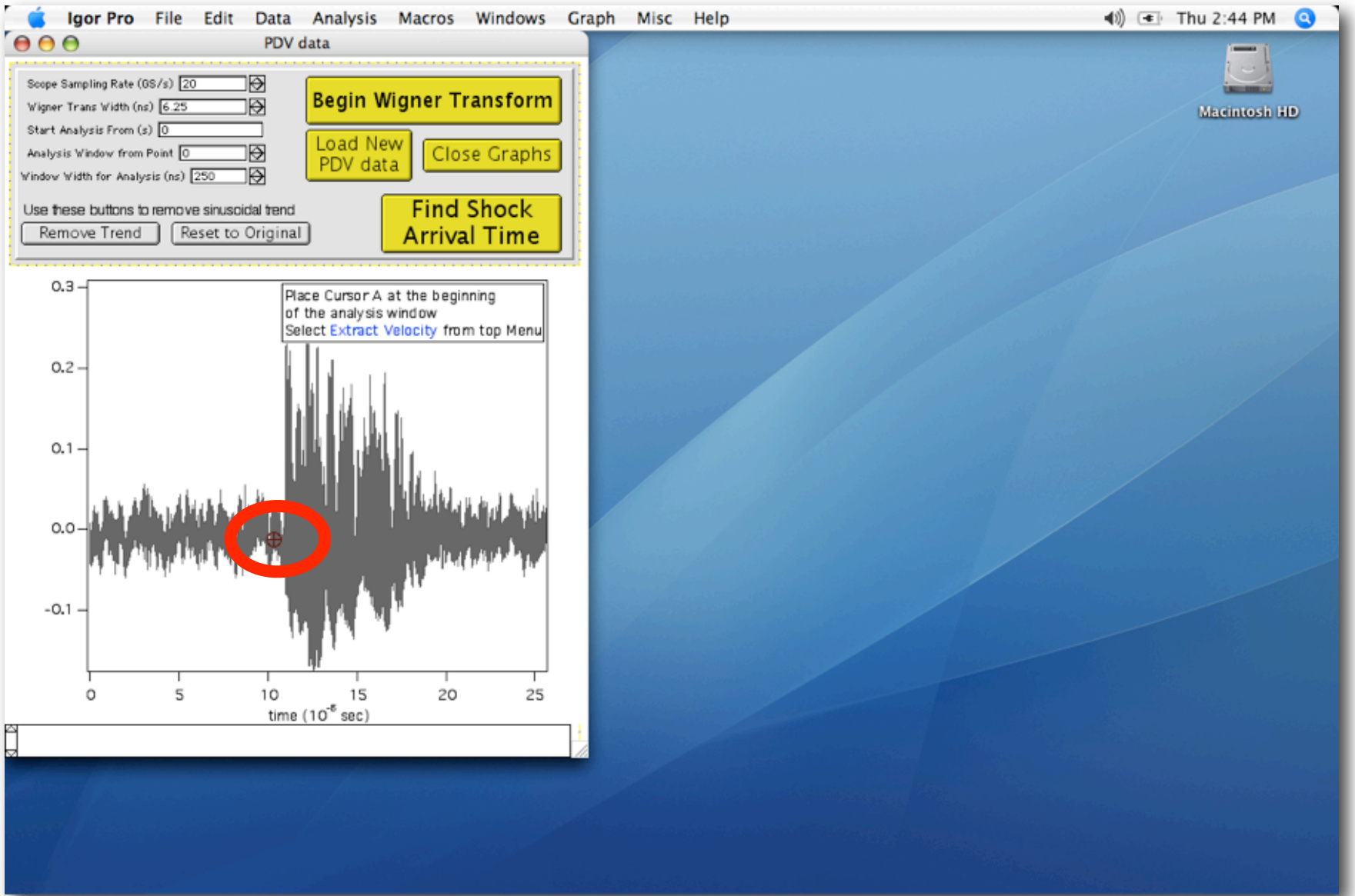

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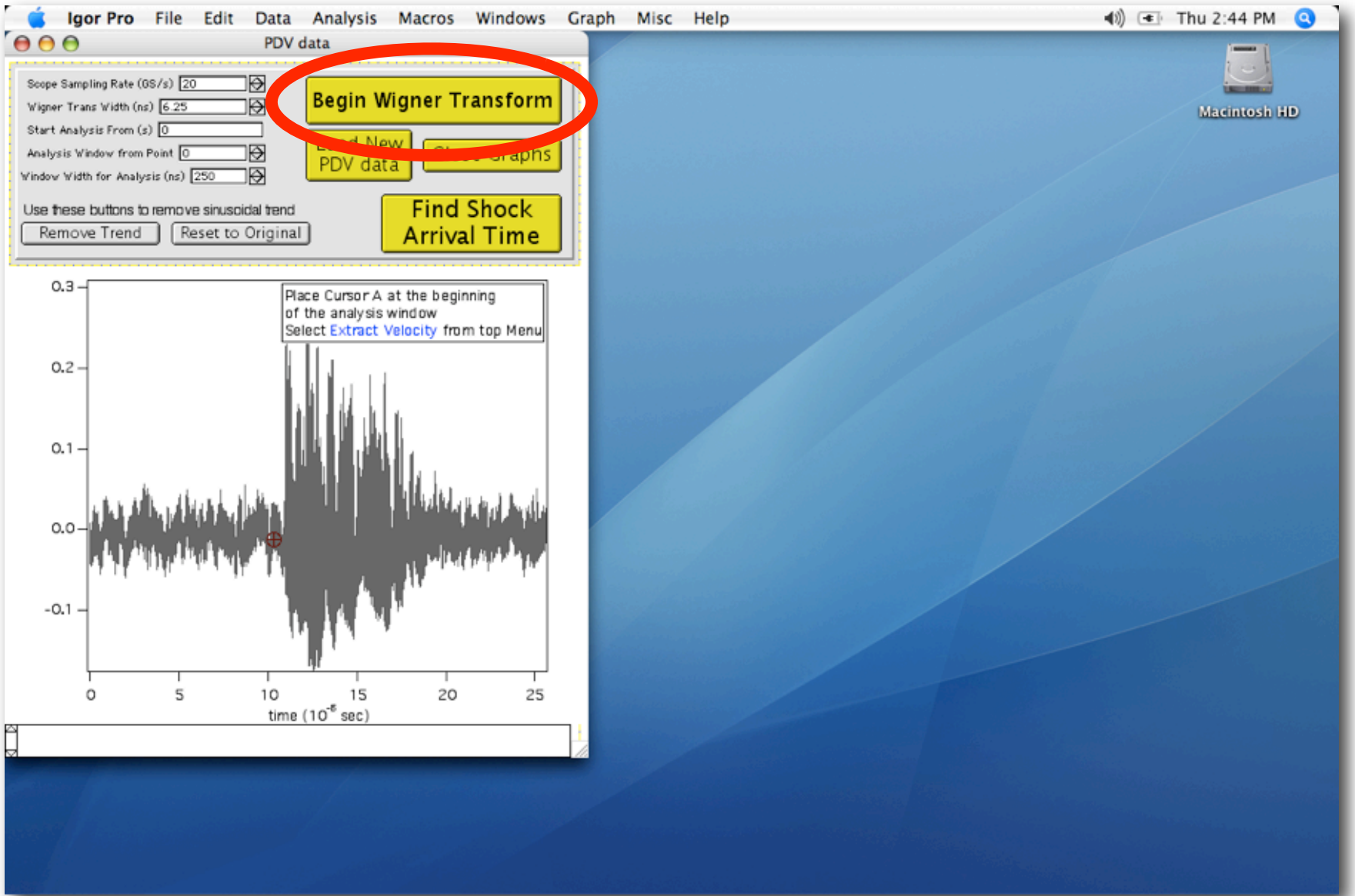
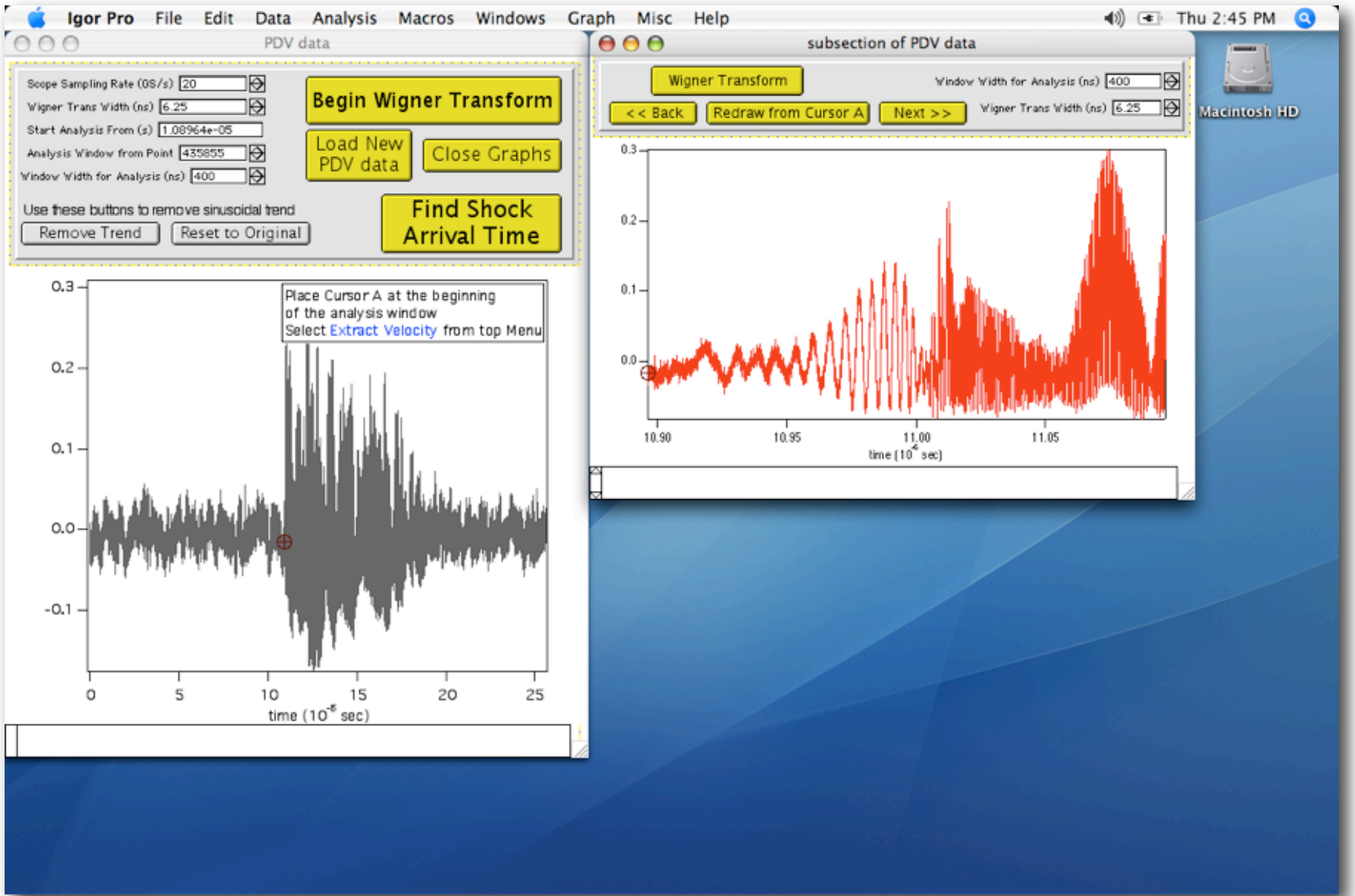


Data from Ted Strand

Click ‘Begin Wigner Transform’ to bring up a zoomed in window



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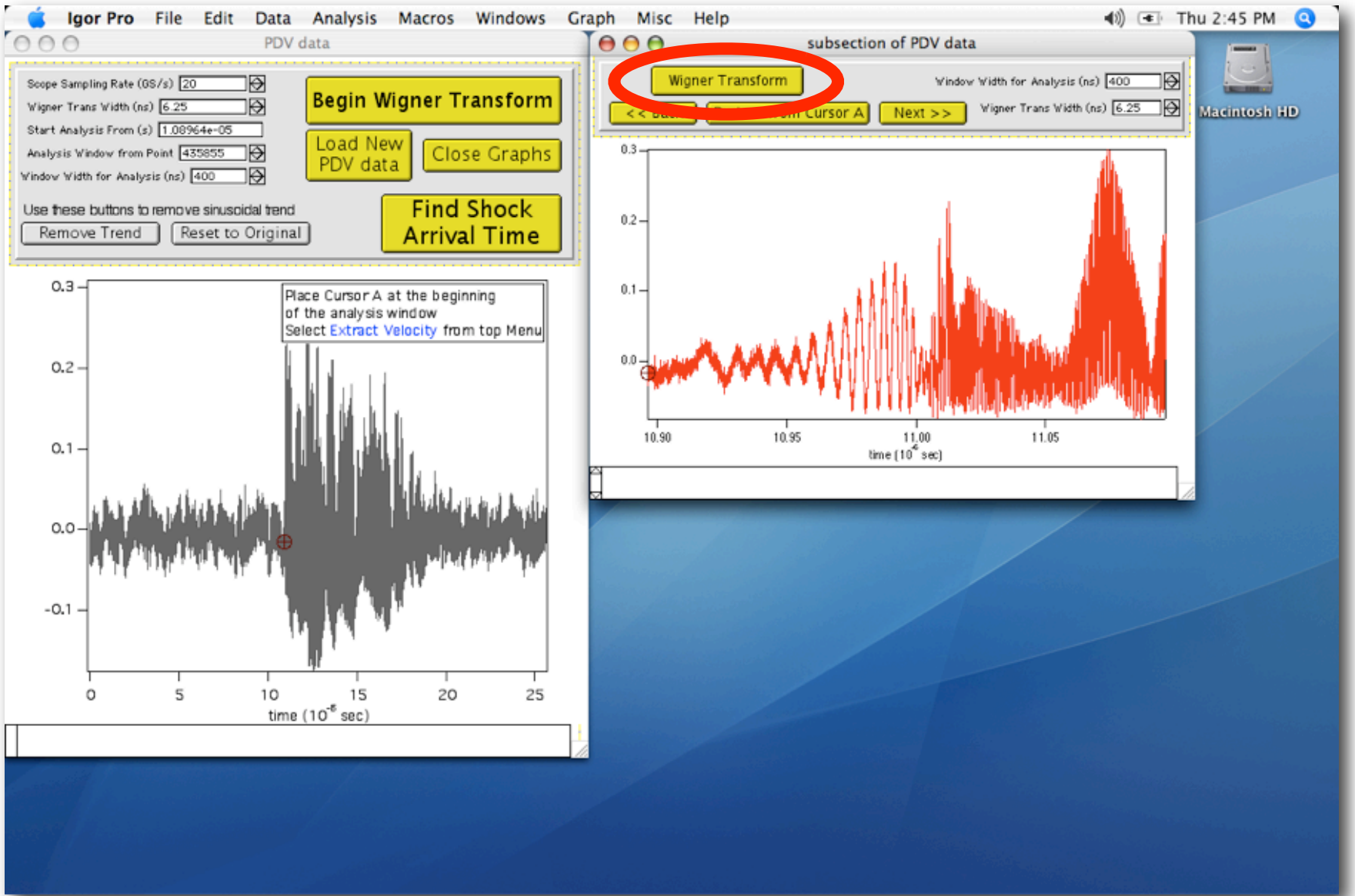
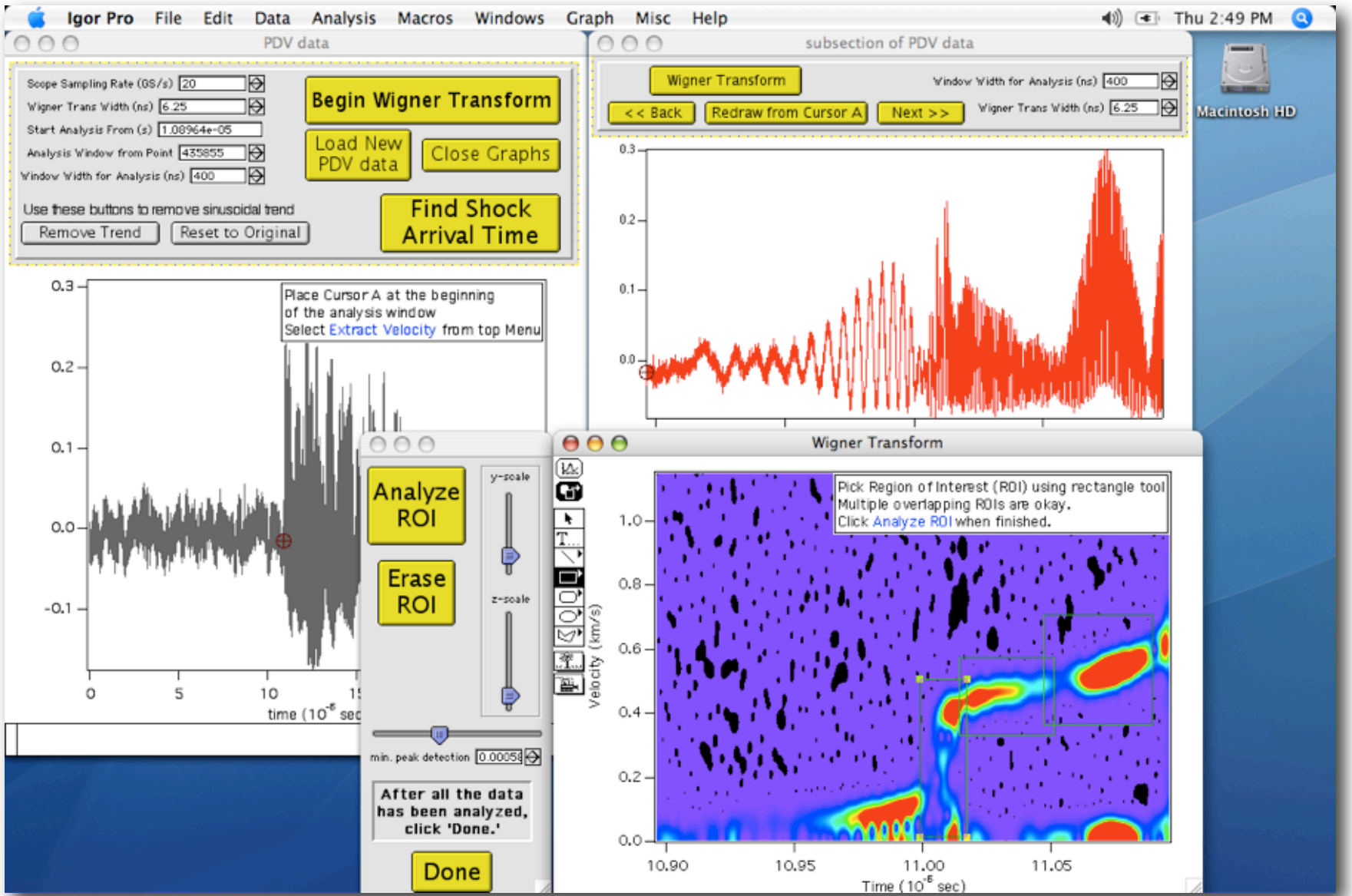


Data from Ted Strand

Perform a Wigner transform over this time window



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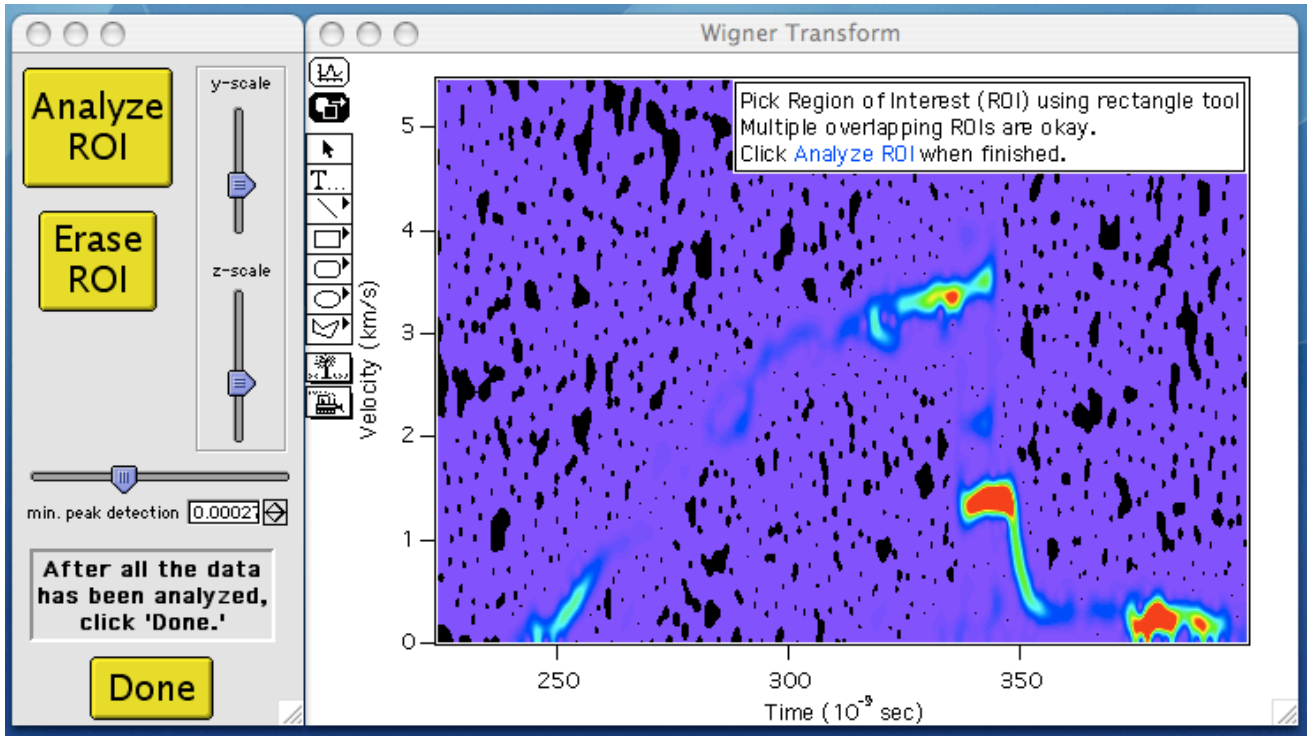
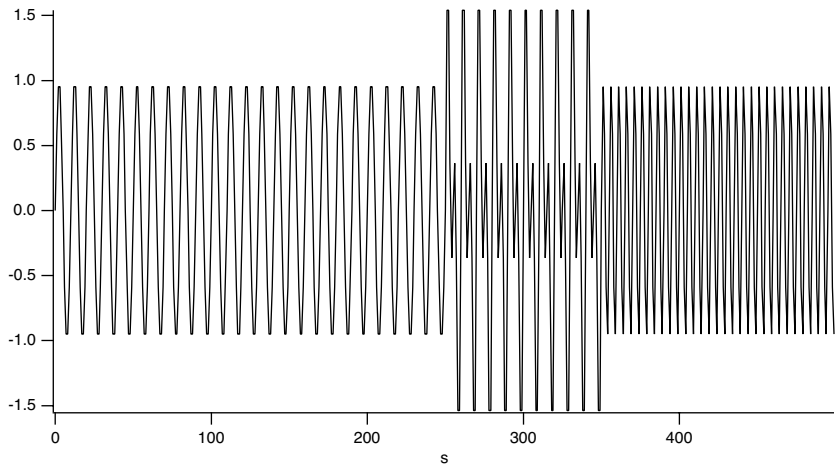
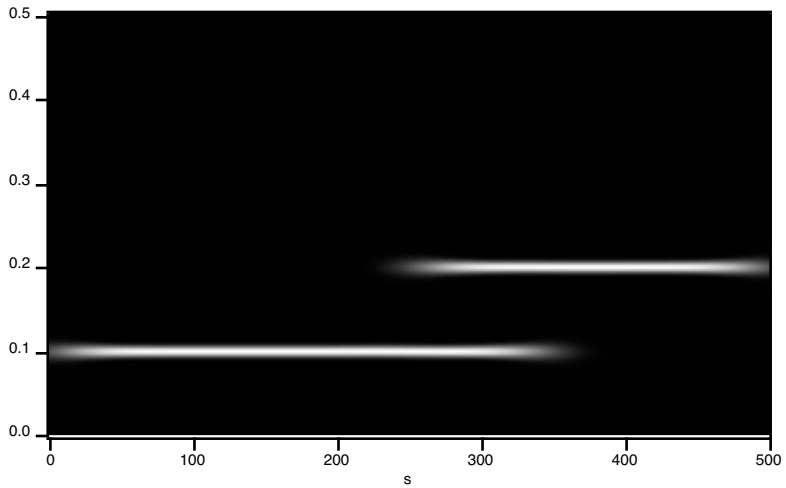


Data from Ralph Hodgin

- Graph shows velocity vs time
  - Red regions show large amplitude
  - Black regions show low amplitude
    - Can be scaled from the left and will be ignored
- Analyze ROI button creates velocity vs time data

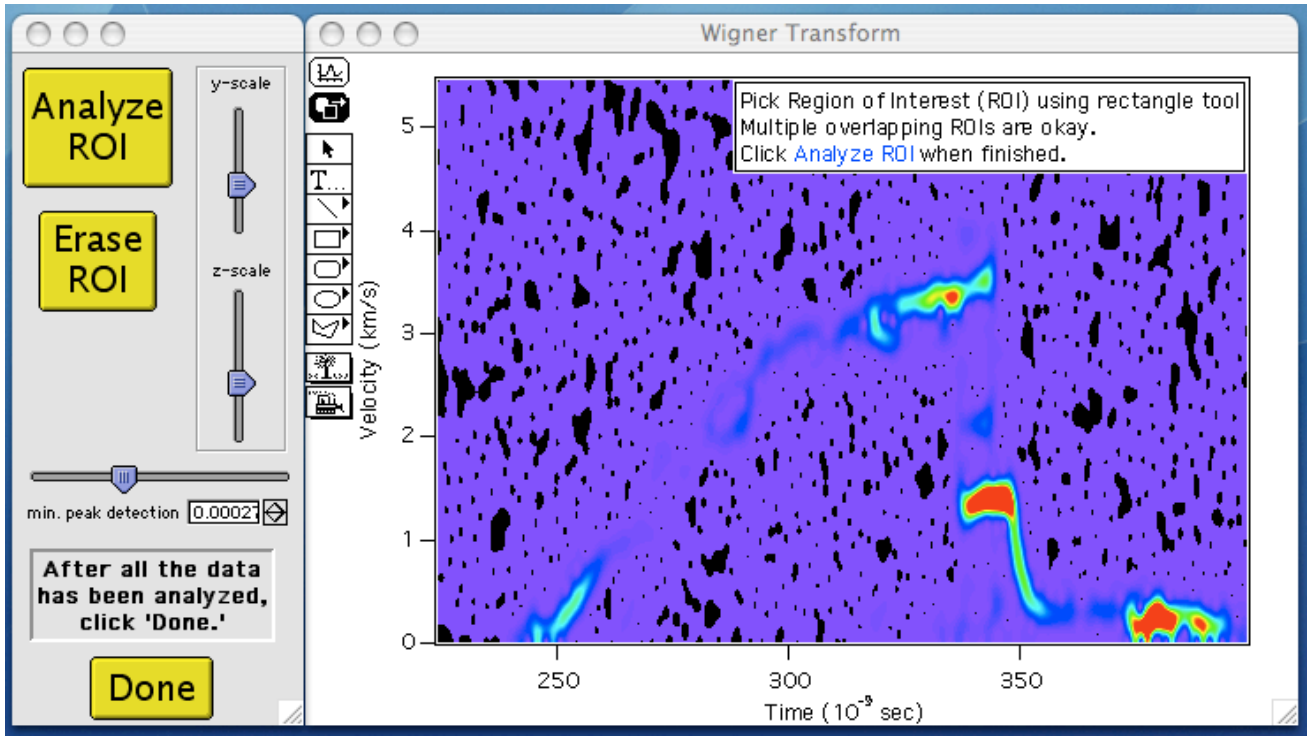
Wigner Transform





- Is analogous to creating a musical score
  - Input sound at a given frequency vs time
  - Create an image of the frequency (velocity) vs time

Wigner Transform



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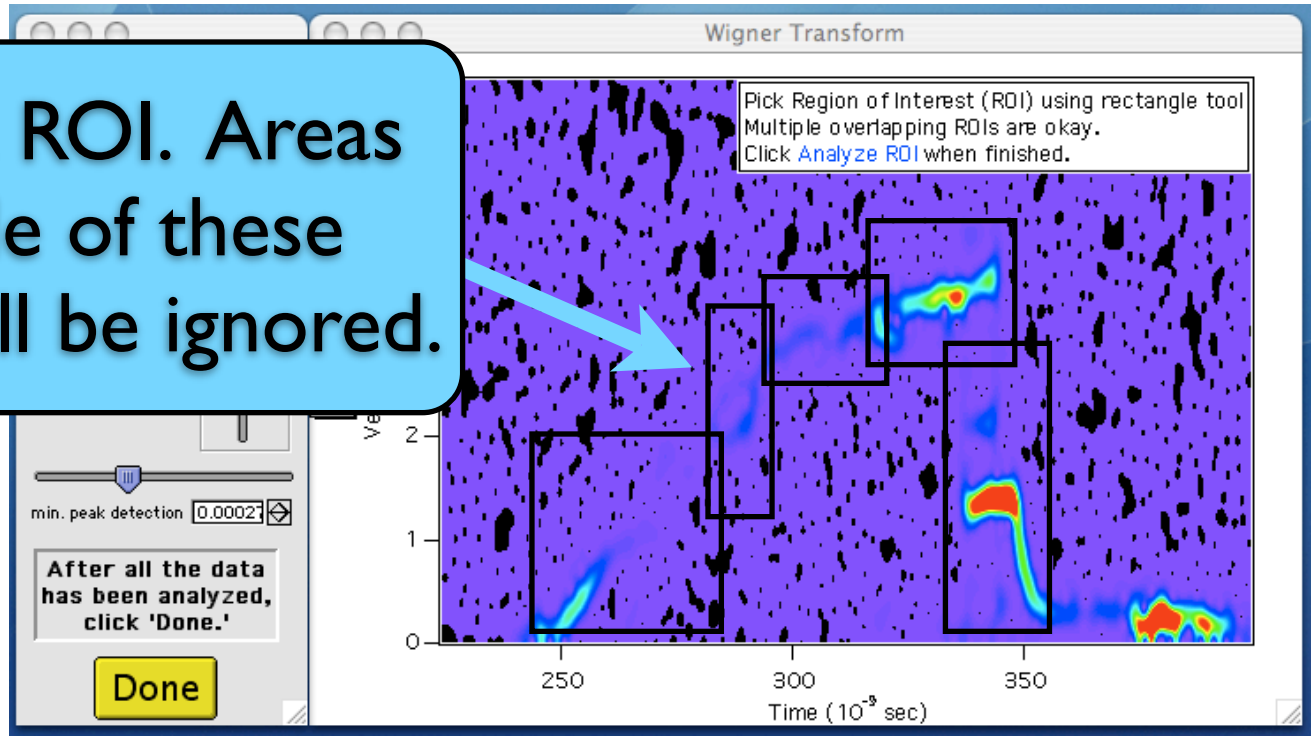

Select a ROI. Areas outside of these boxes will be ignored.

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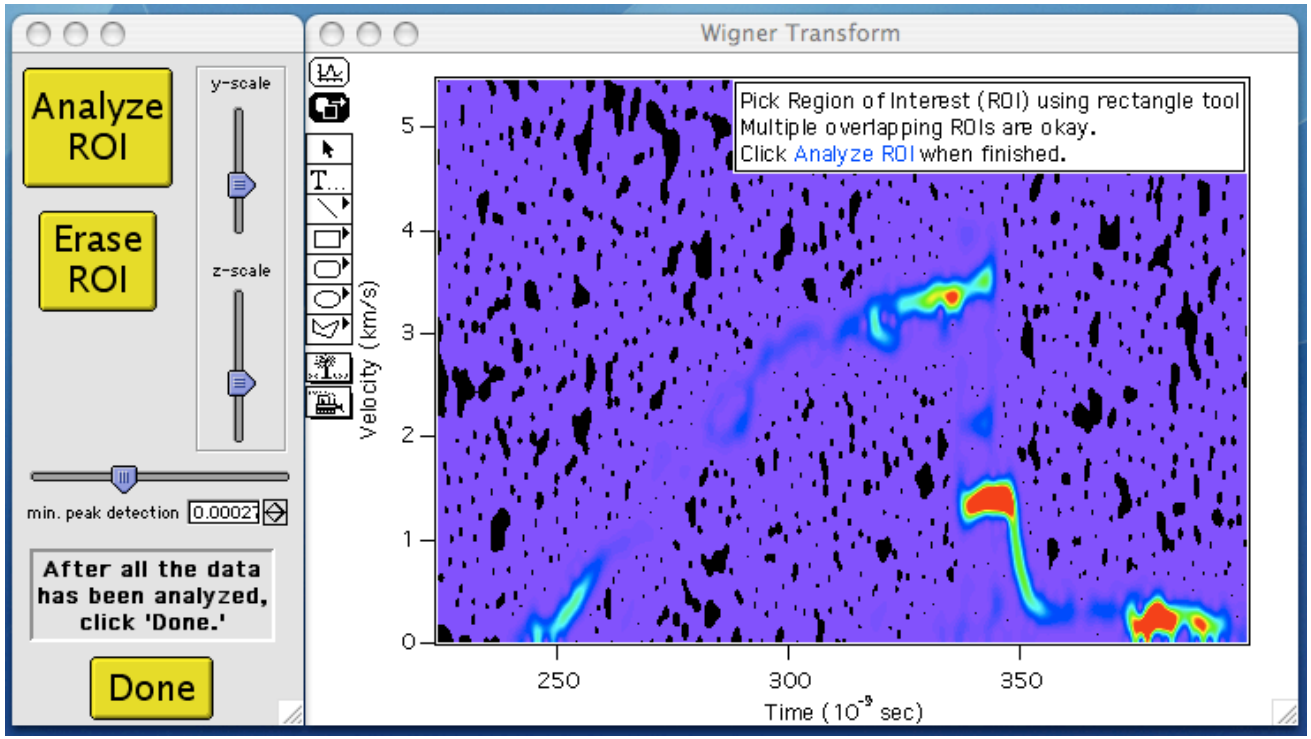

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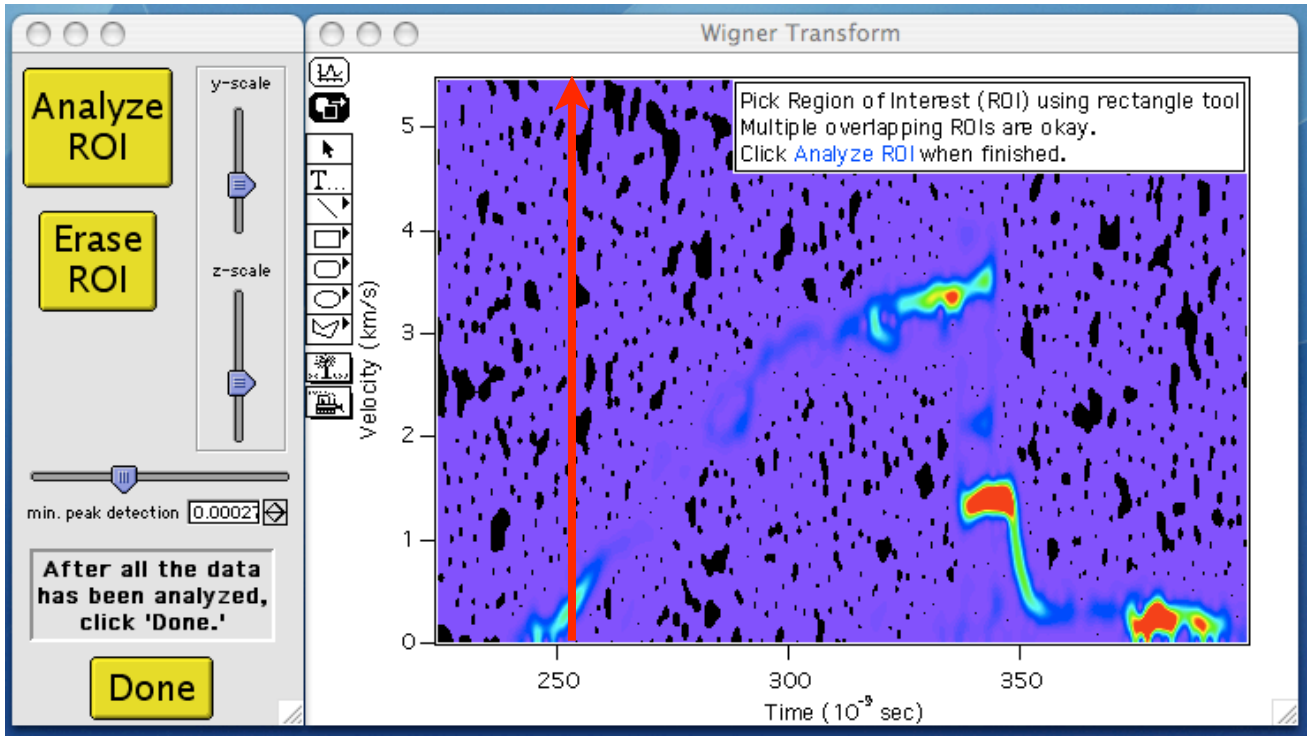

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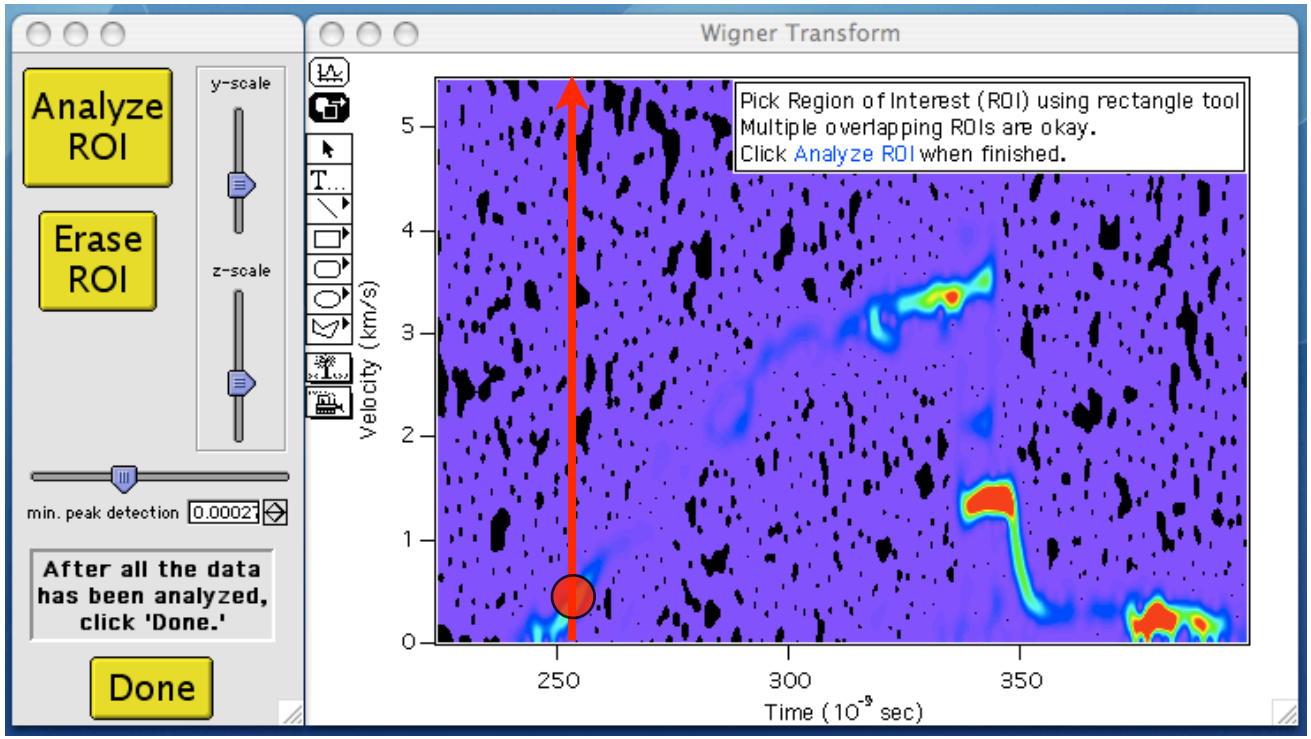

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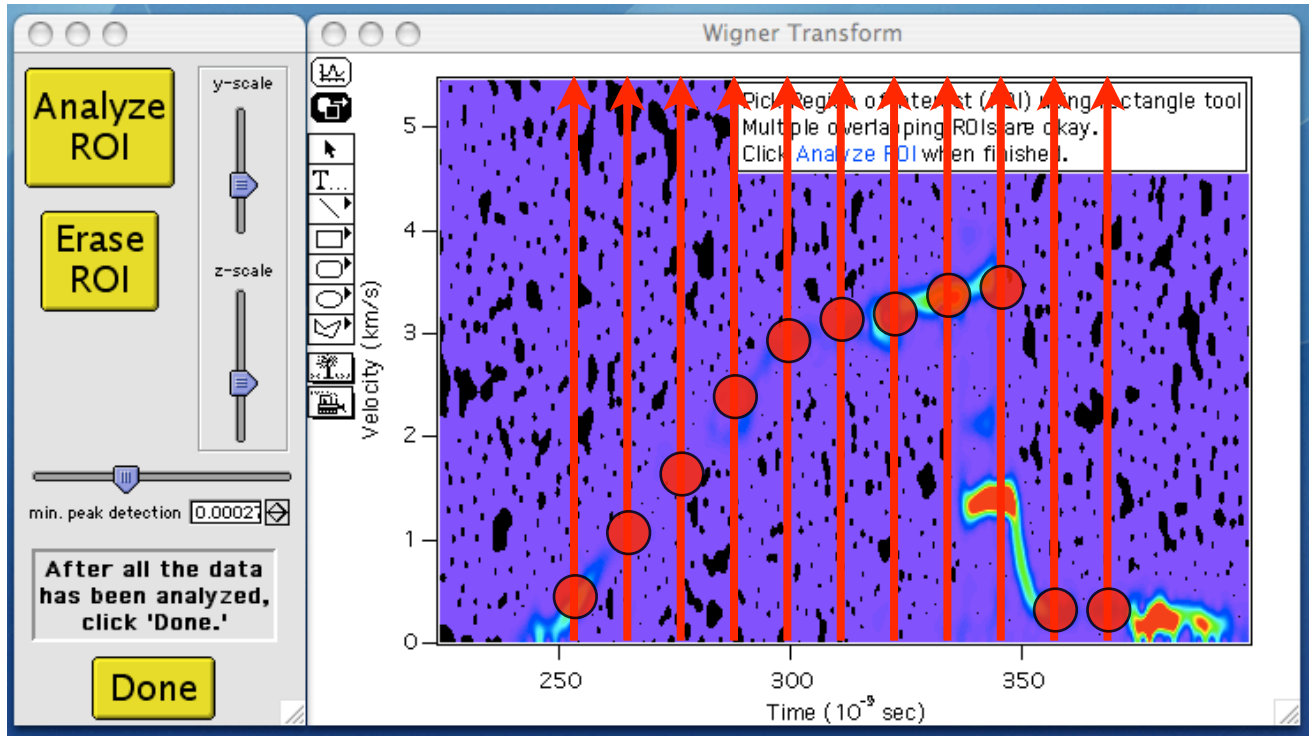

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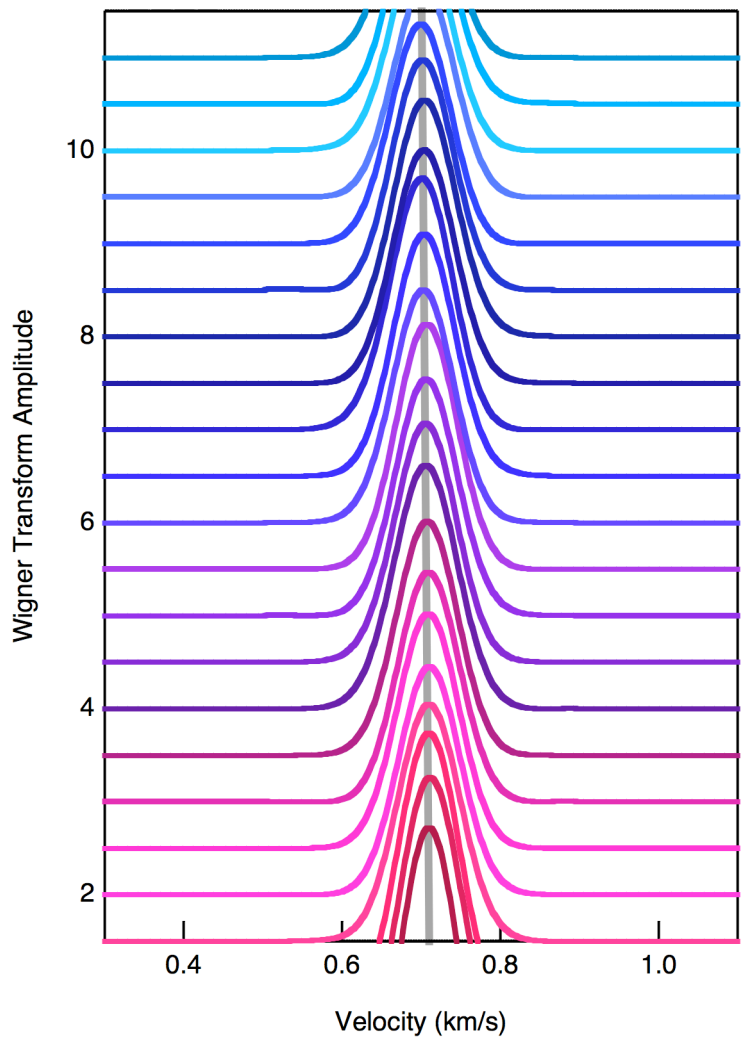
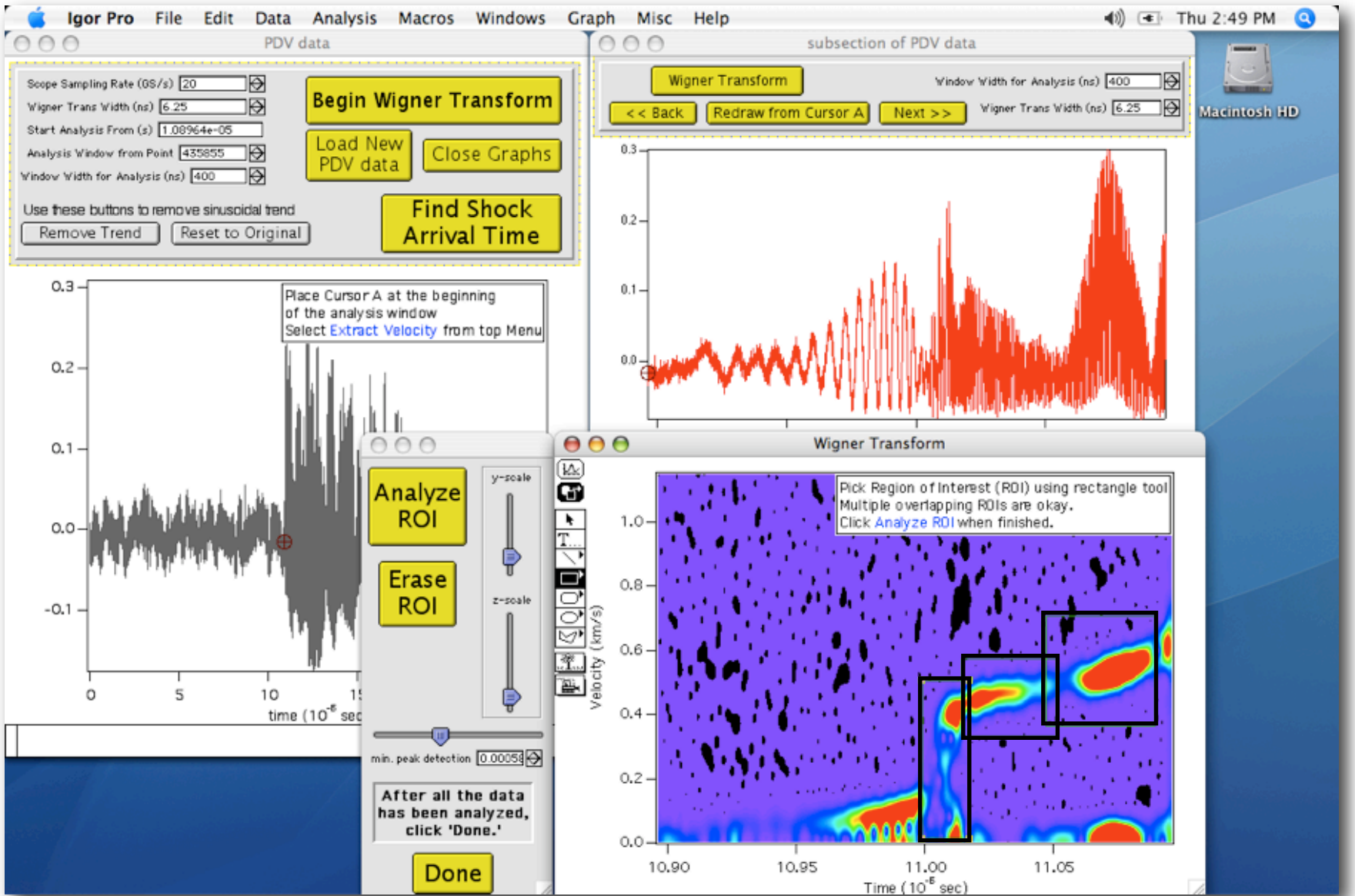
Velocity vs Time



- Each column (time slice) of the Wigner Trans. is analyzed for the maximum intensity
  - velocity is found by the location of gaussian peak
- Final output saves:
  - Time
  - Velocity
  - Velocity Error (Gaussian peak error)

Perform a Wigner transform over this time window



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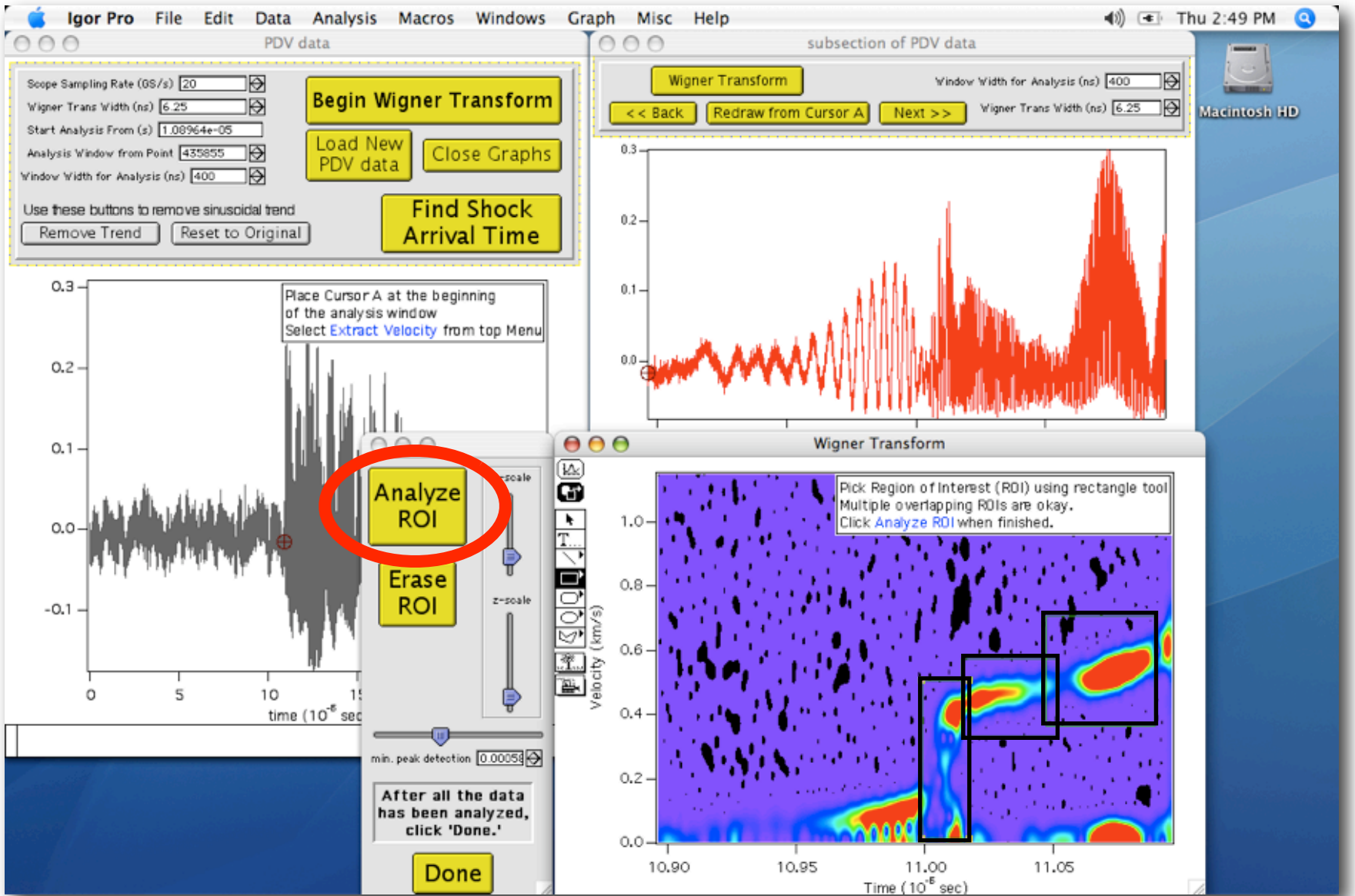
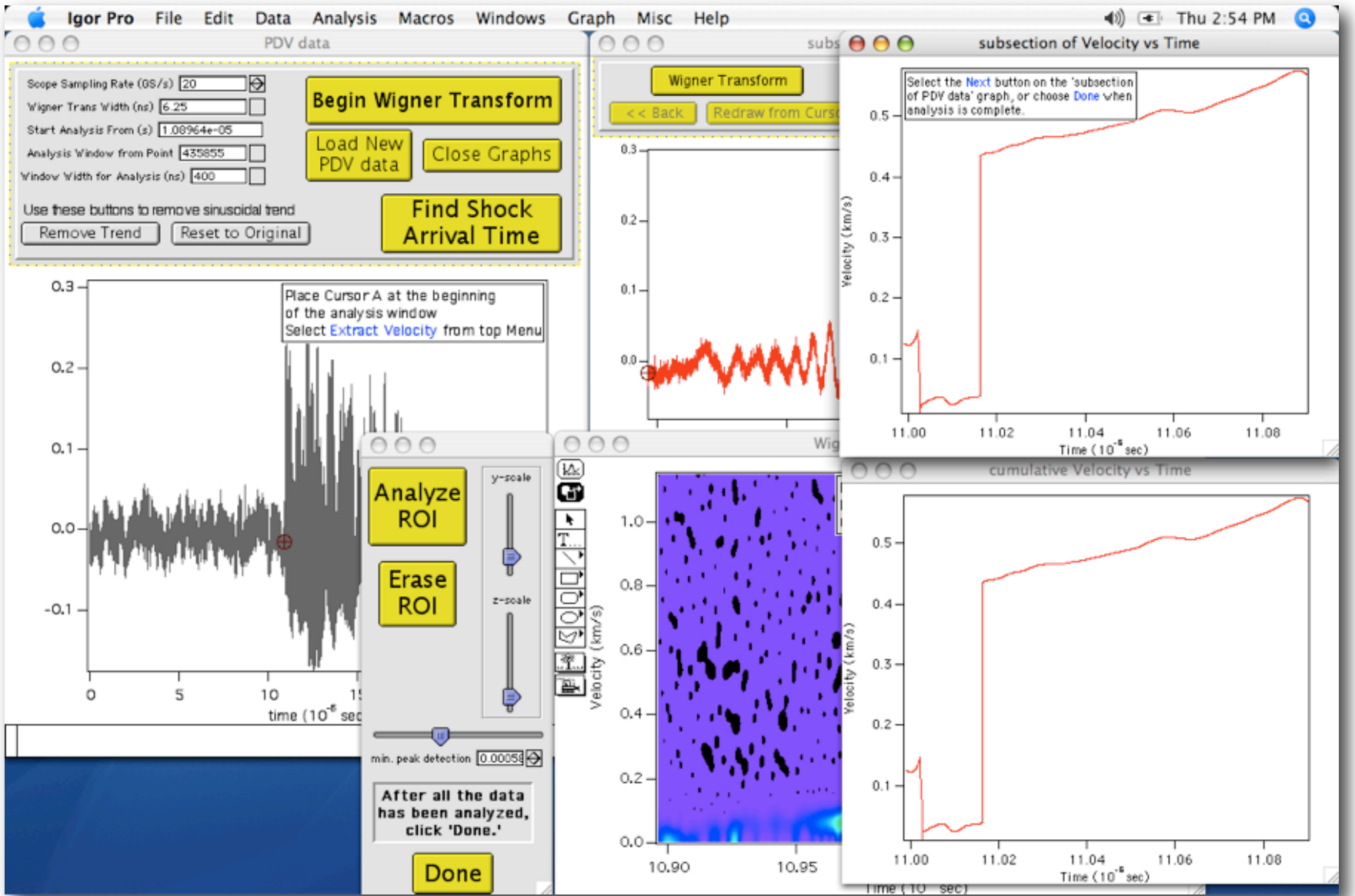


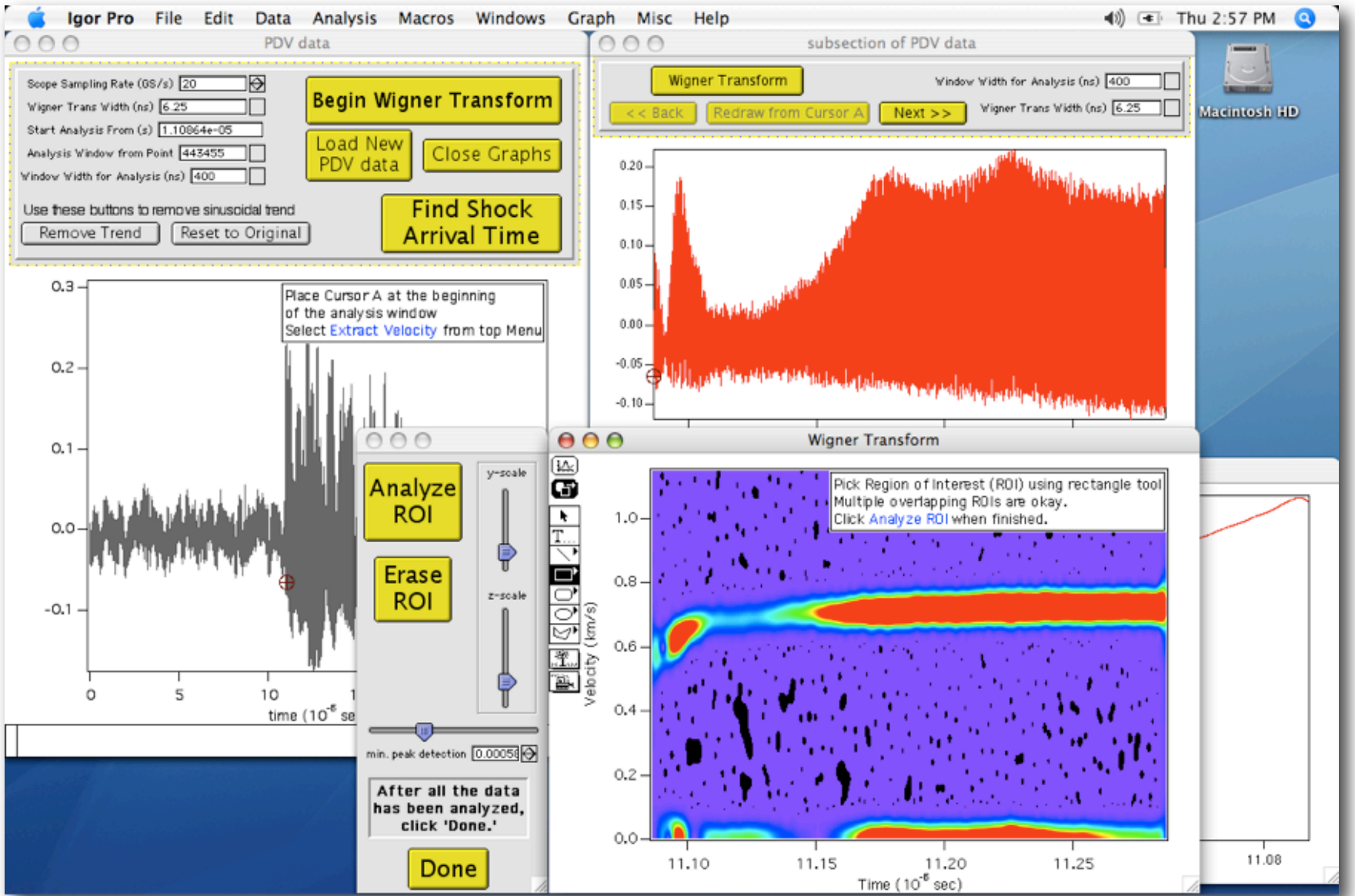
Data from Ted Strand

Record of Velocity vs Time



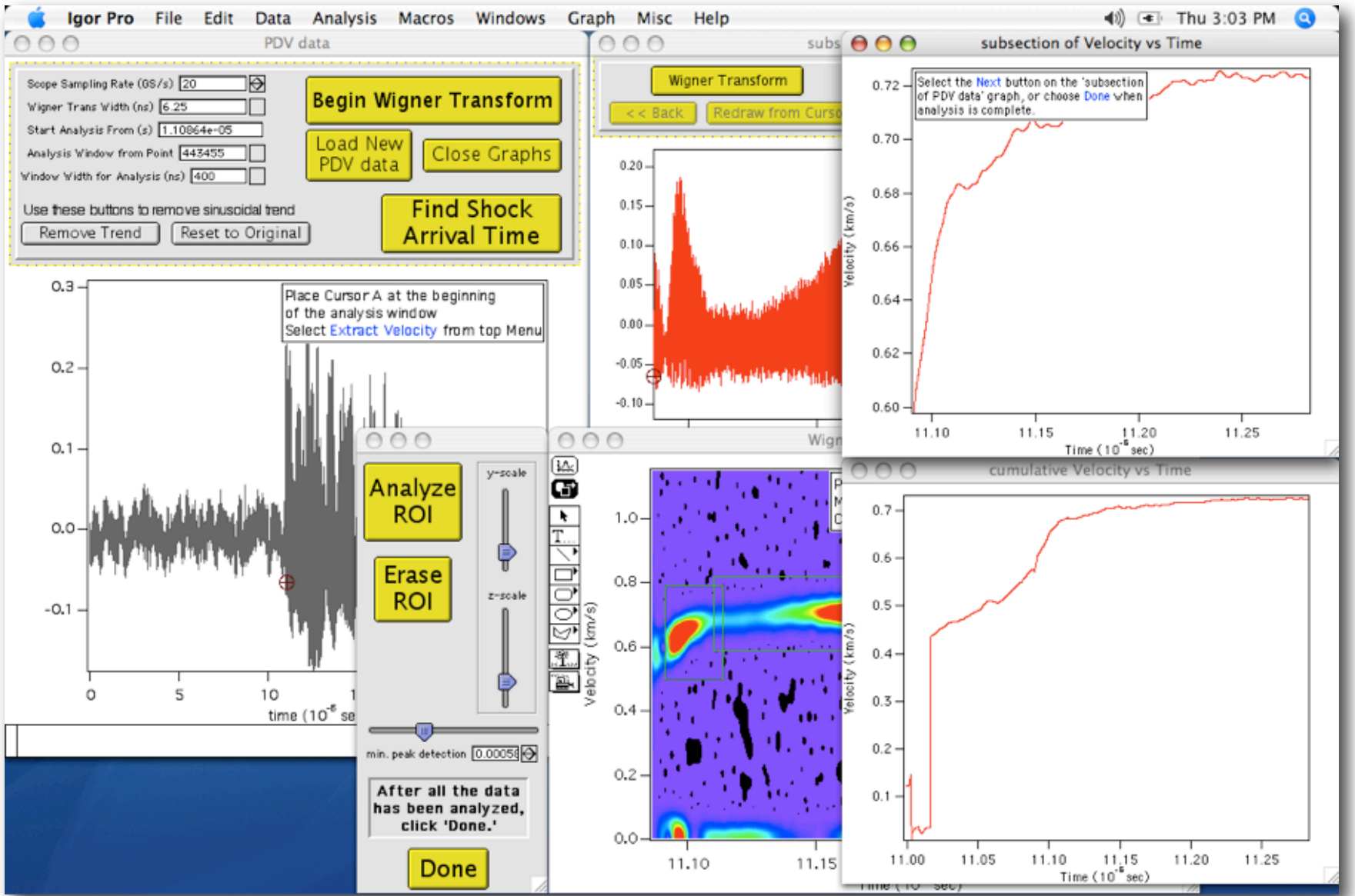
Data from Ted Strand

Go to next section of PDV data and Repeat



Data from Ted Strand

Continue making Velocity vs Time graph



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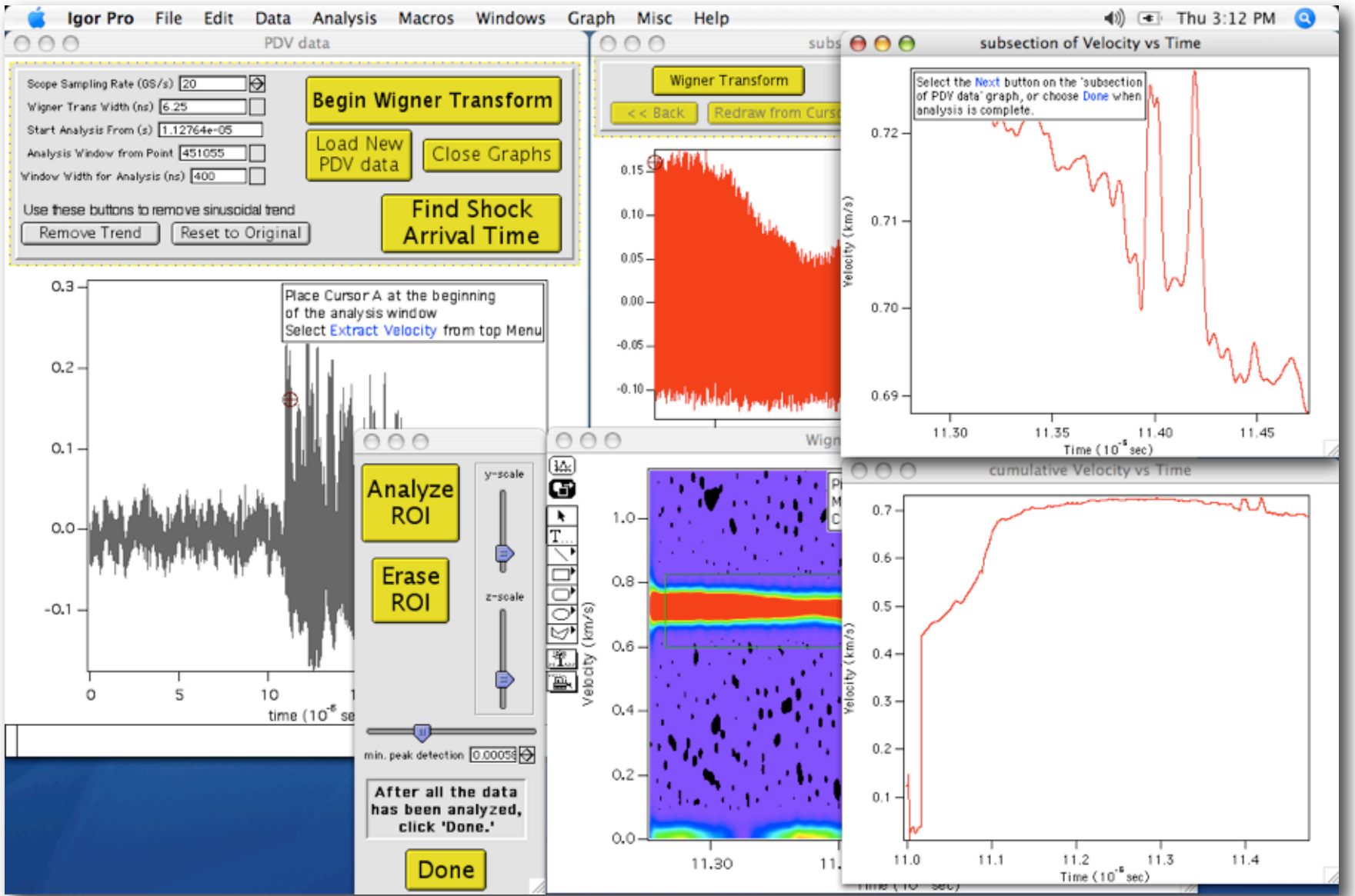

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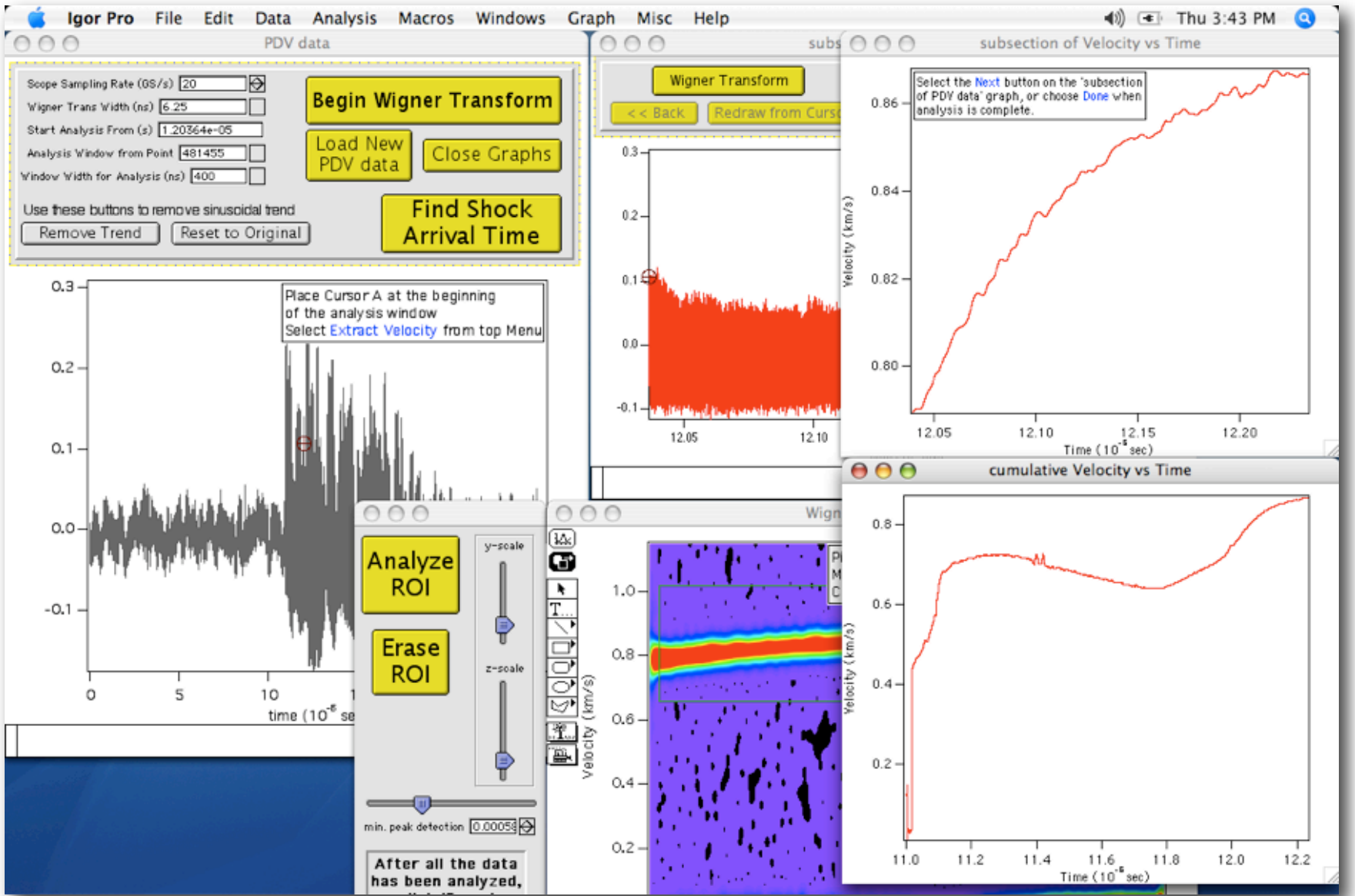

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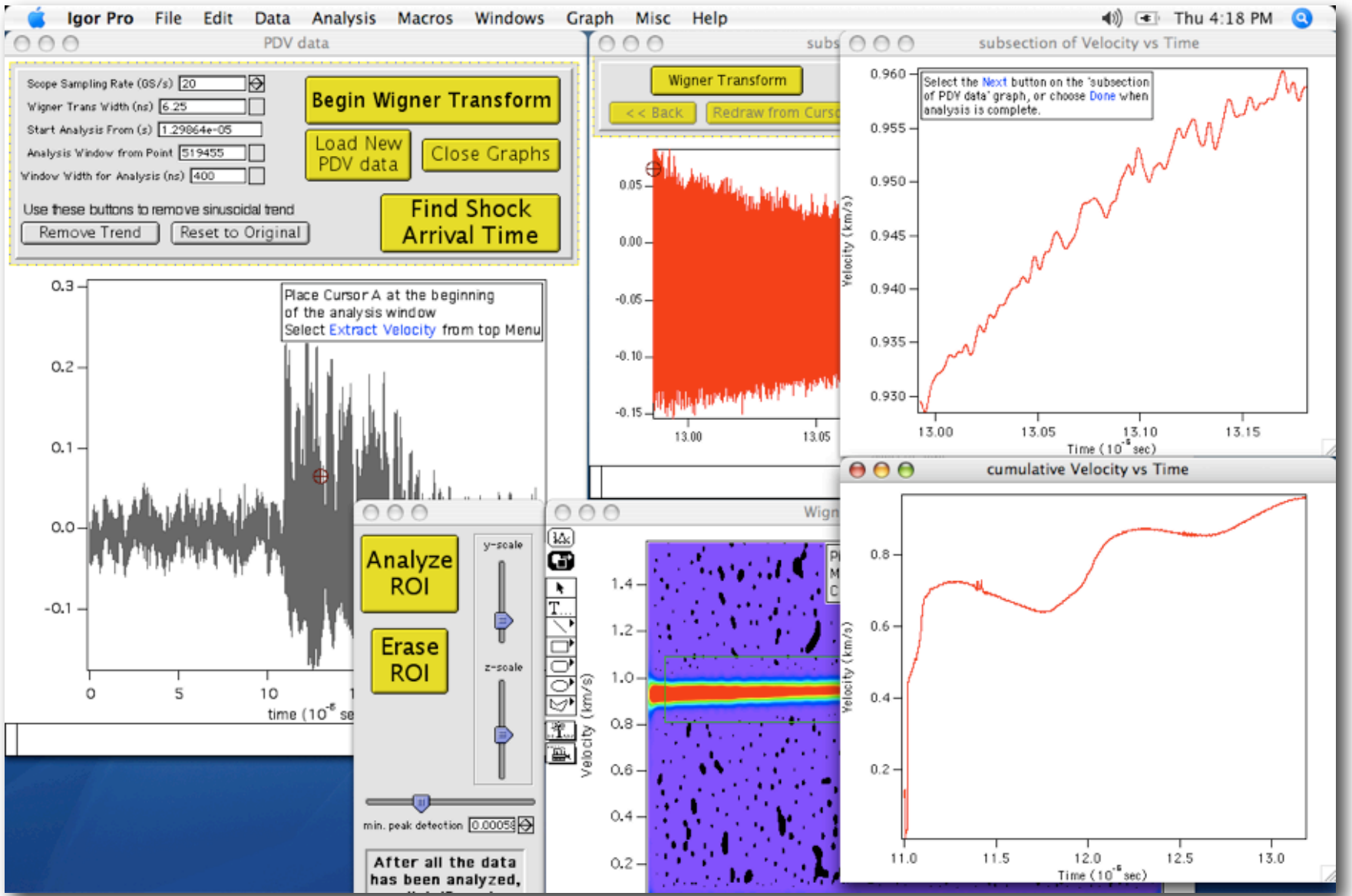

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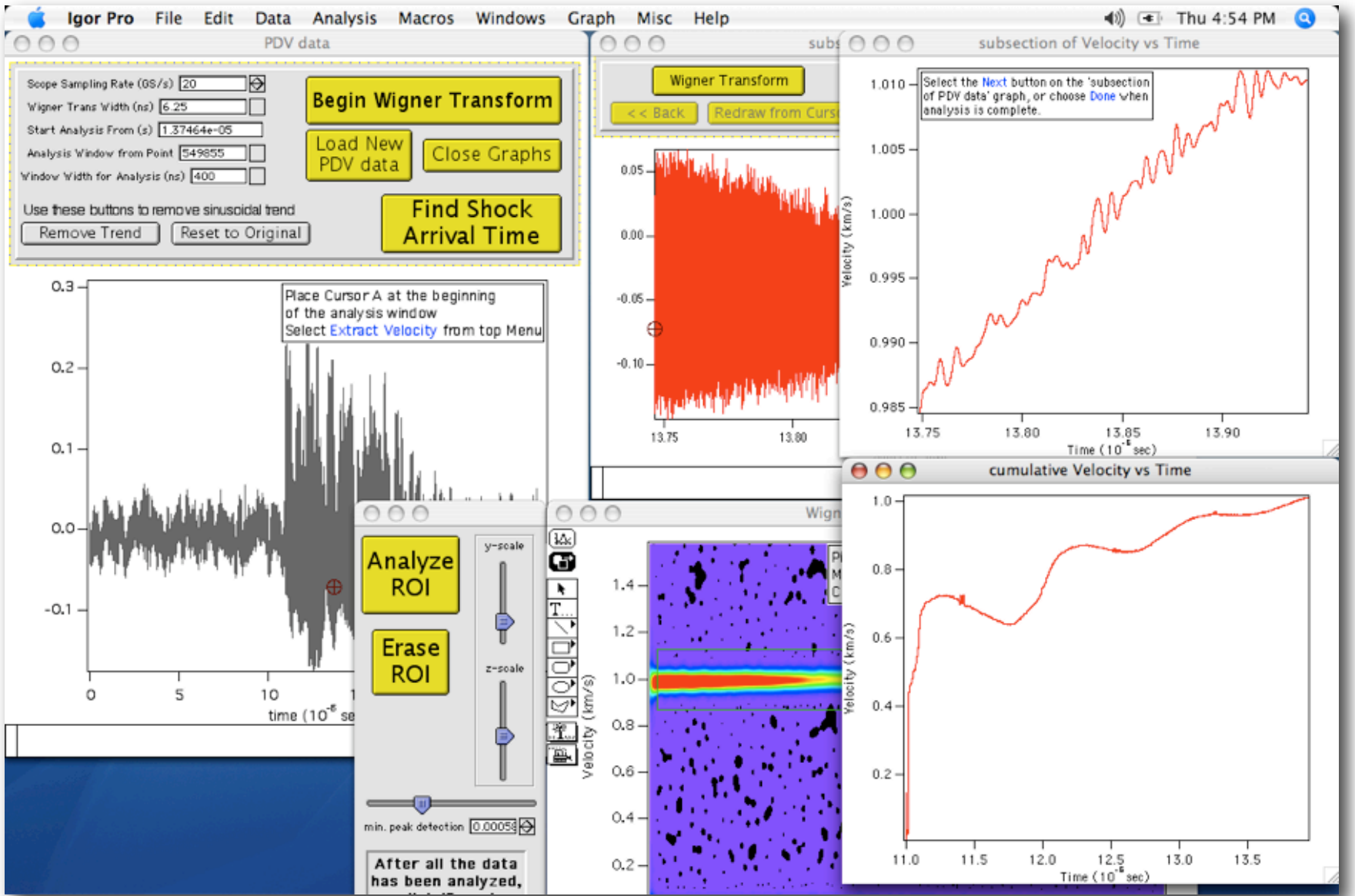

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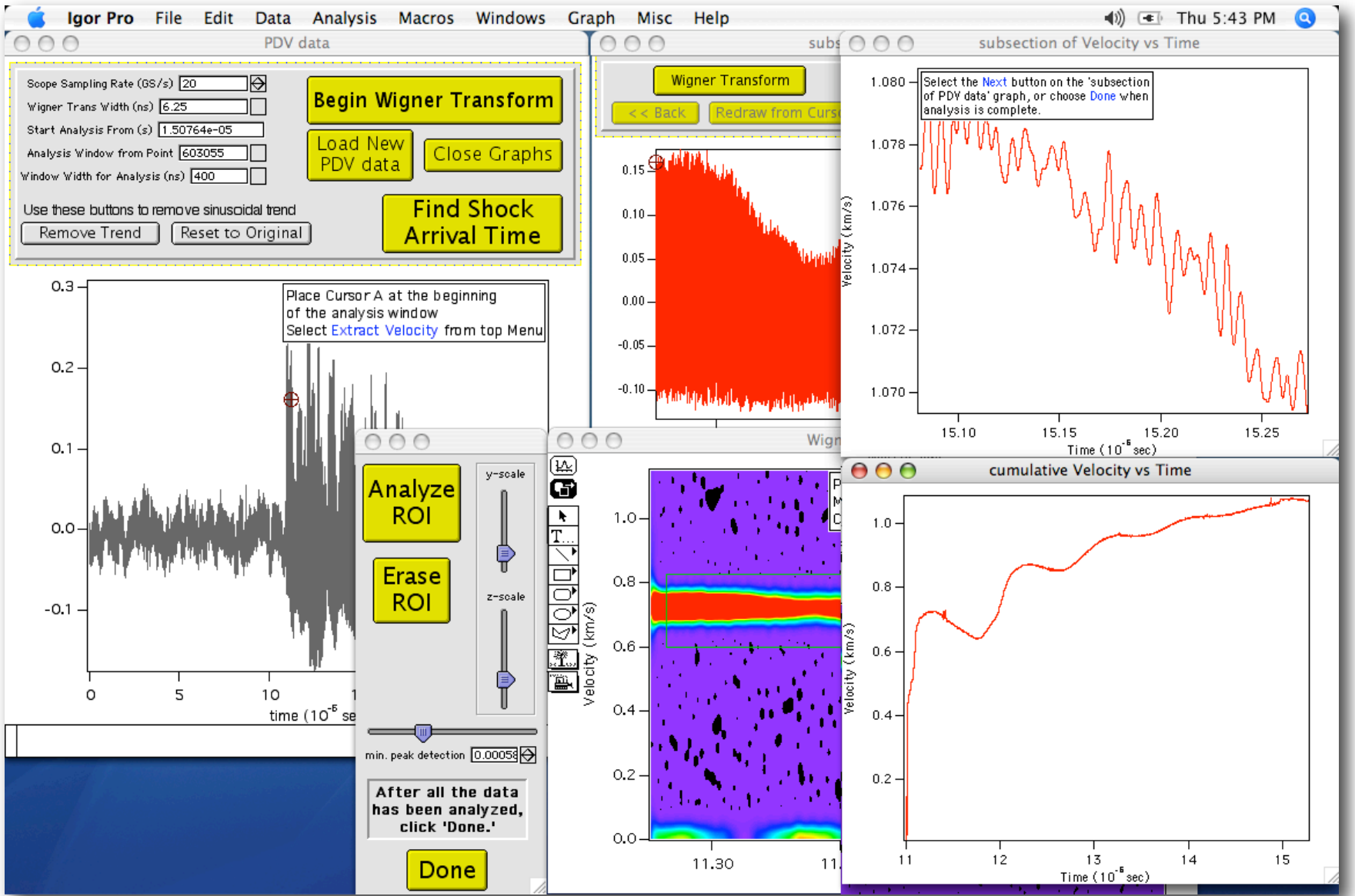

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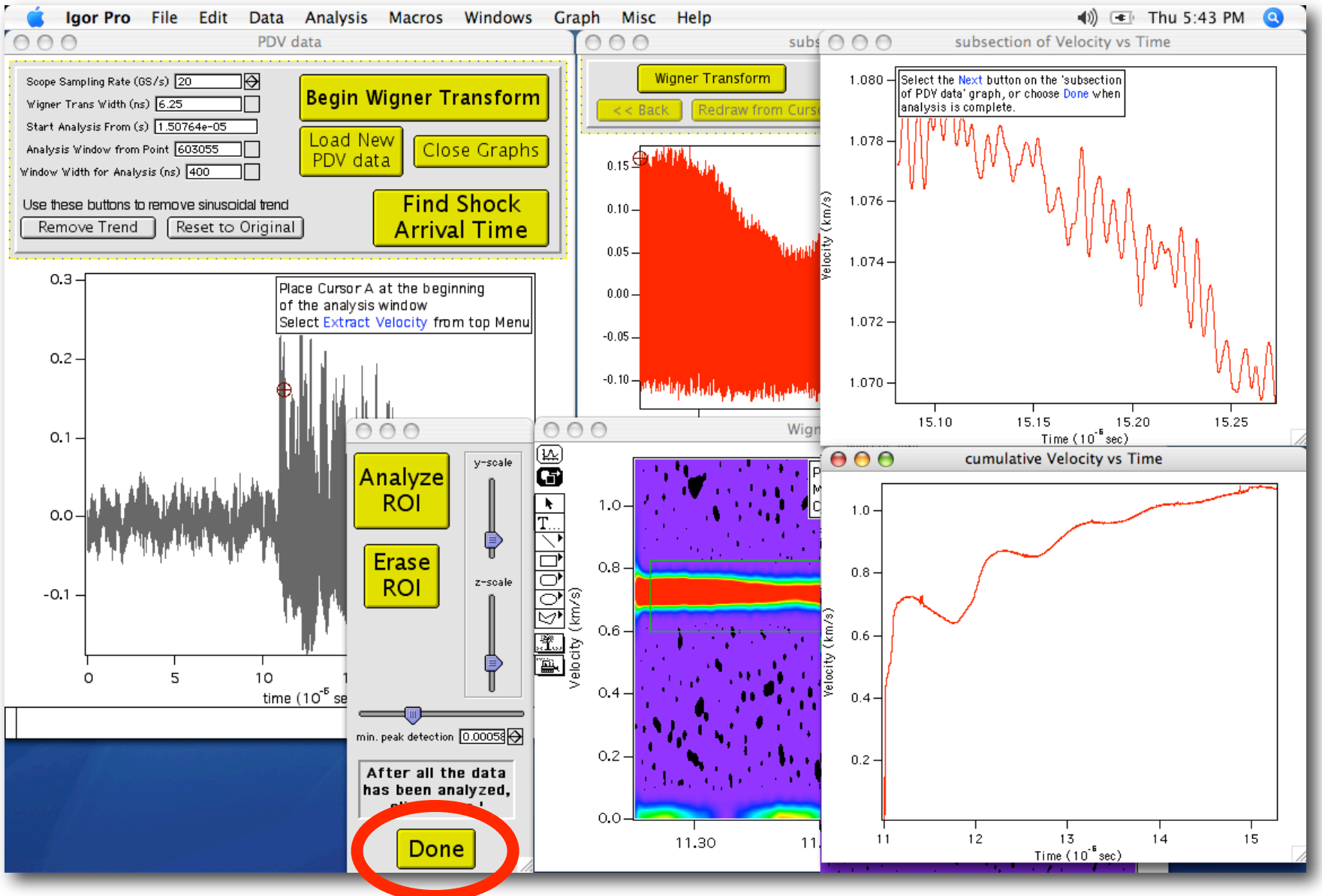
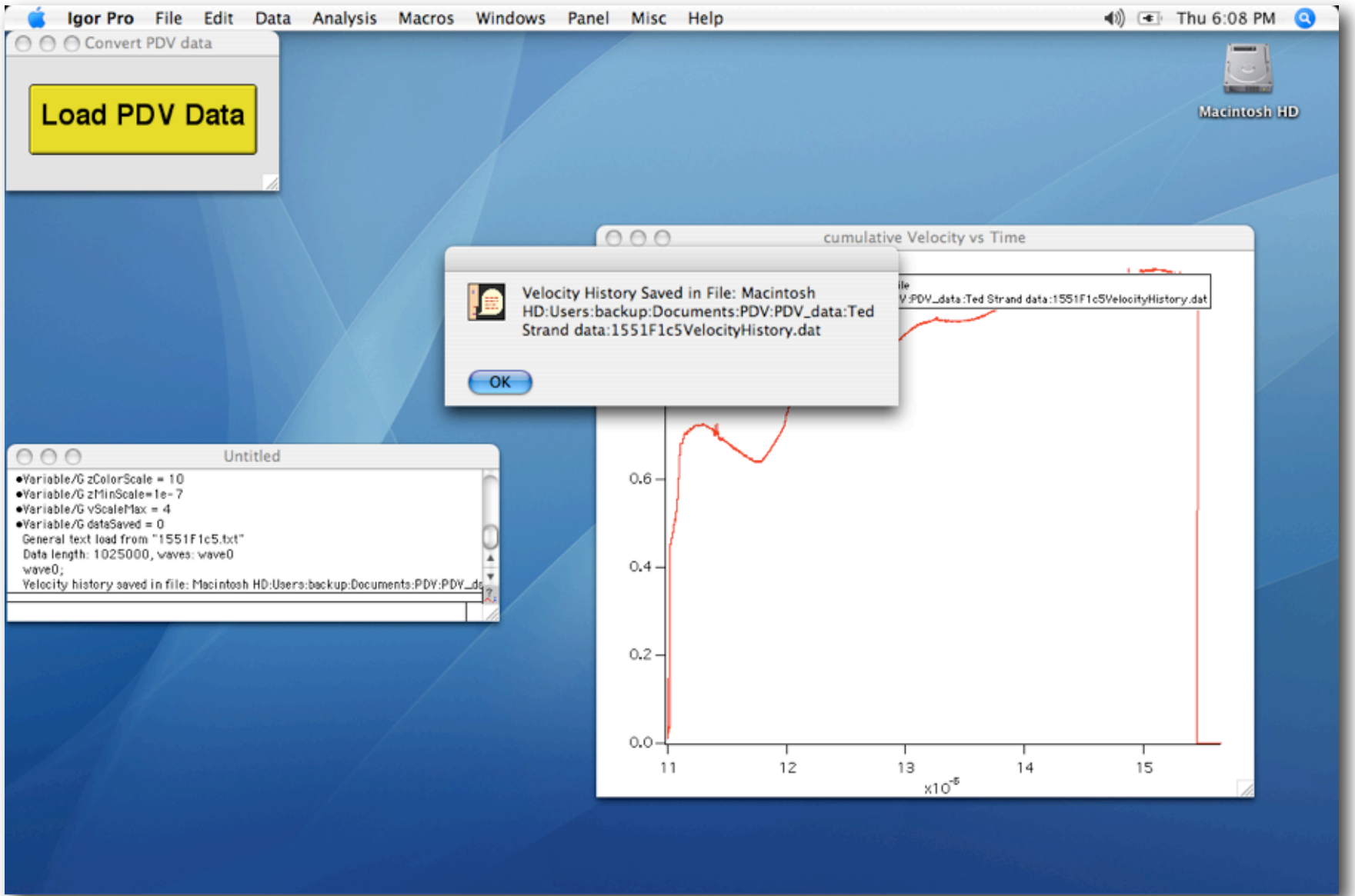


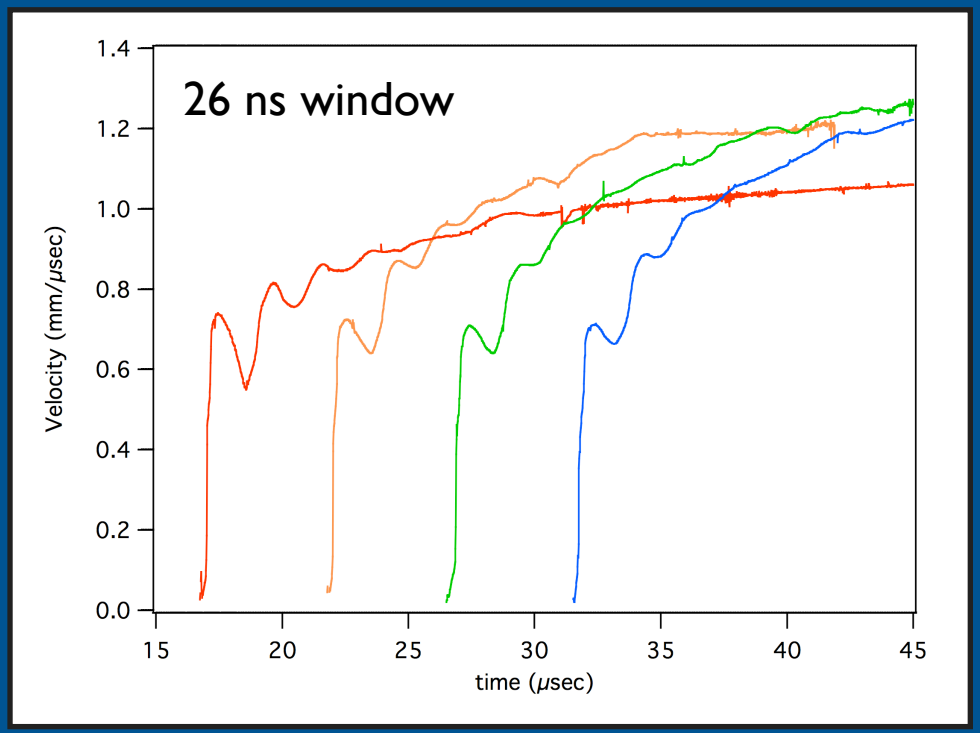
Data from Ted Strand

Save data to a new file when finished

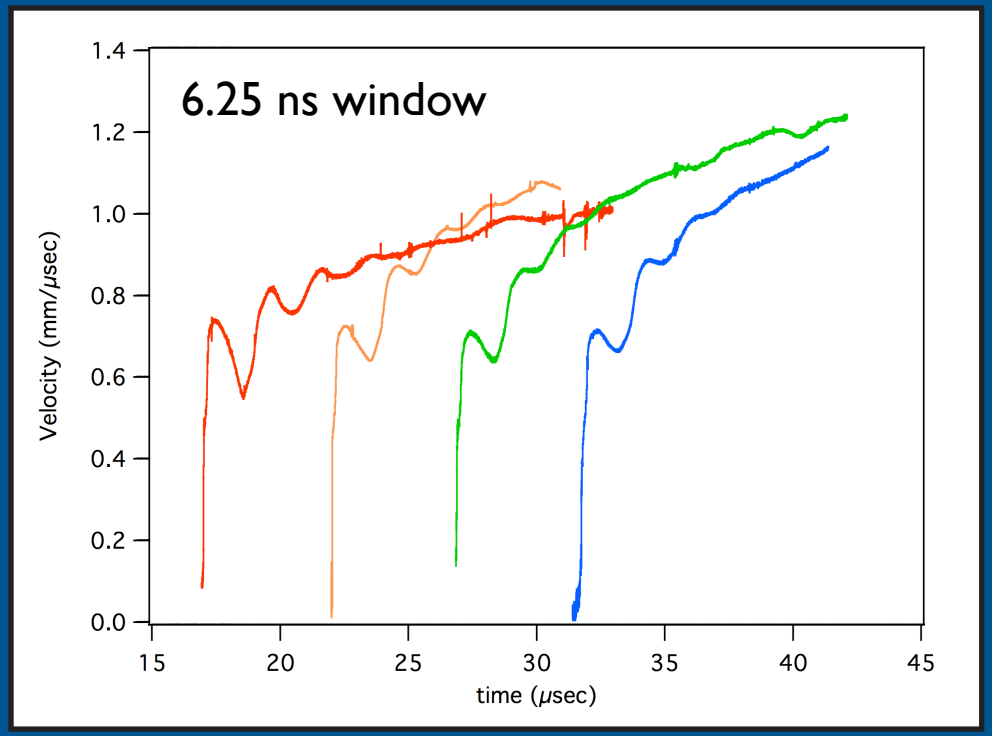


Data from Ted Strand

Comparison of Methods



Analyzed via MatLab



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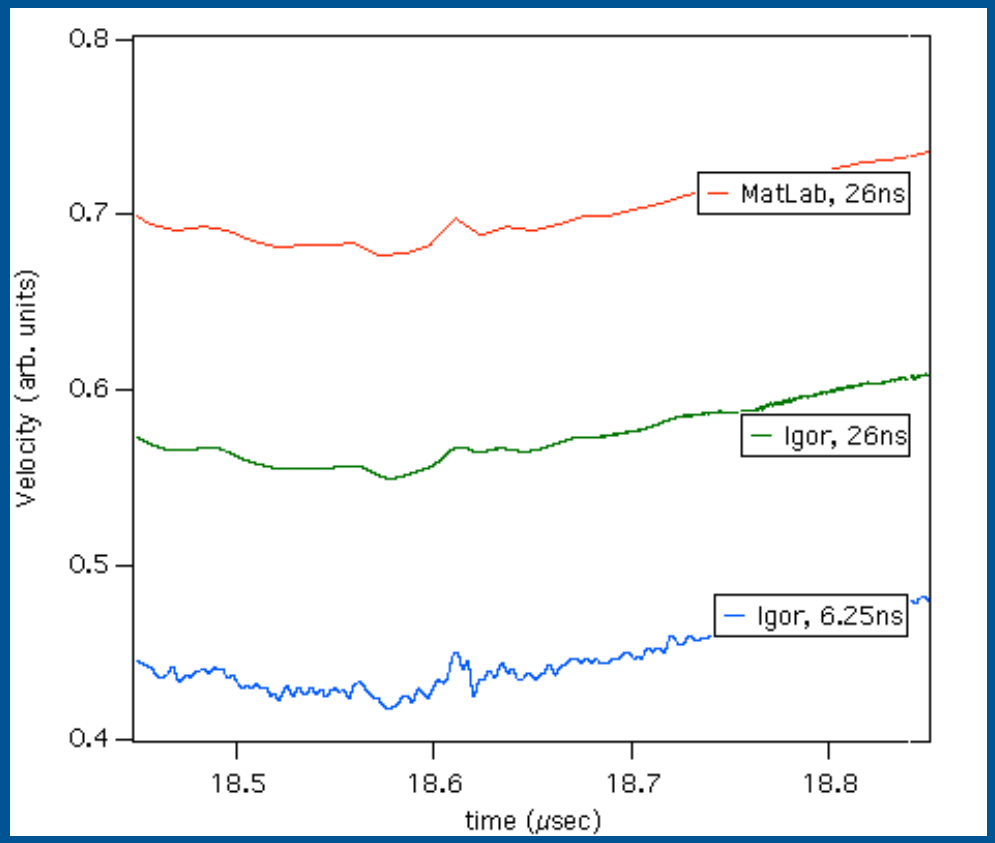

Analysis Comparison

- MatLab has a roughly 1:240 point compression over Igor

PDV Analysis using Igor Pro

- Routine reads in PDV data files
    - Either Voltage vs time or just Voltage
- Goes through sections of the data to perform a Wigner Transform
- Exports a velocity vs time history (csv file)

- Can also use to fit a sine wave to the data for determining shock arrival times

Acknowledgments

Ashok Kumar

Ted Strand

Dave Hare

Chadd May

Ed Roos

John Weeks
(WaveMetrics)

Reed Patterson

Ralph Hodgin

‘Remove Trend’ Button